



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

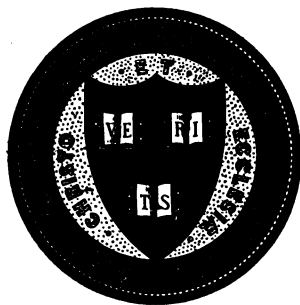
We also ask that you:

- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>

Wax 458.97

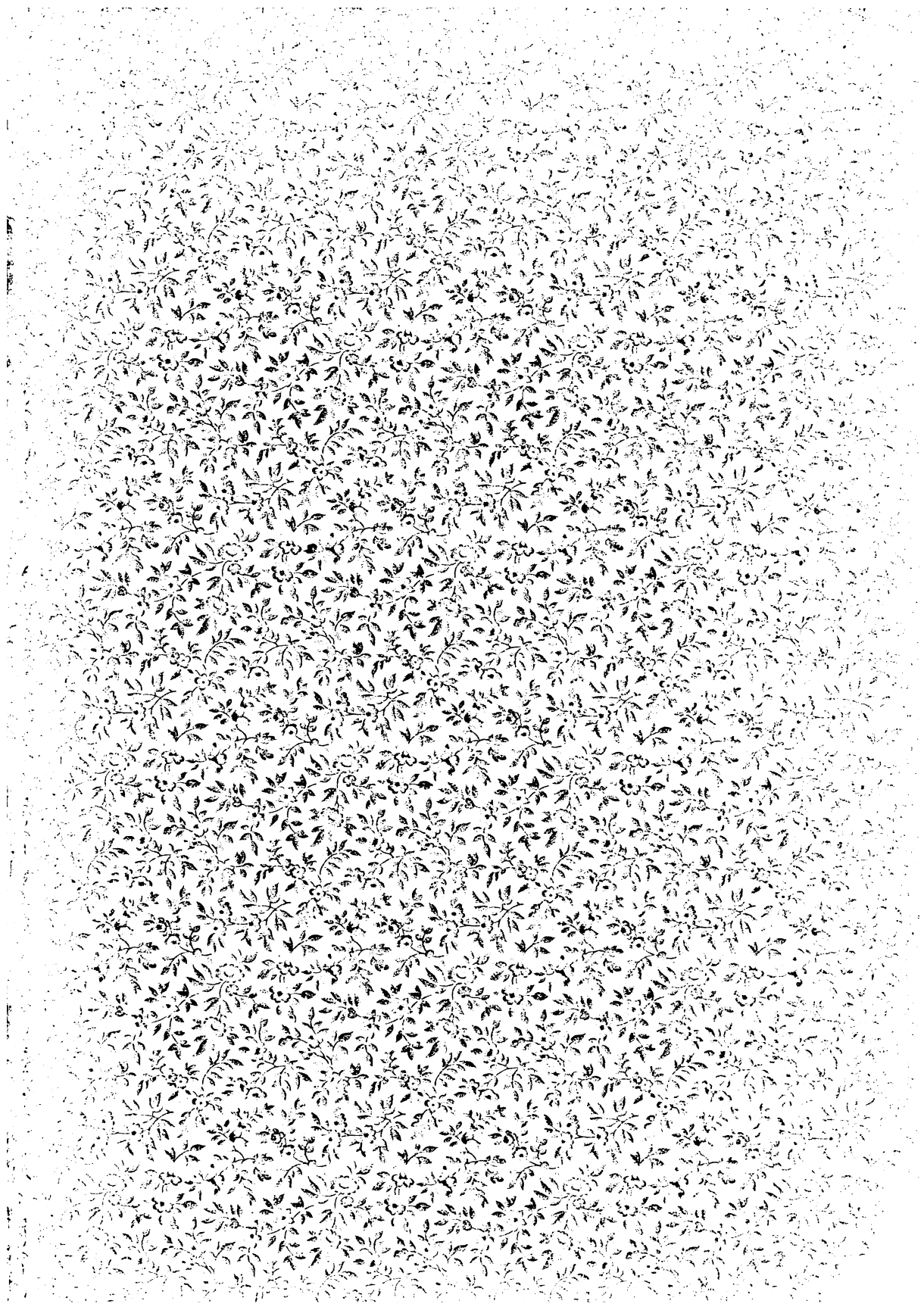


Harvard College Library

FROM

Capt. H. C. Tuthill

2 Jan. 1899





Elementary Treatise

ON

Military Science and the Art of War.

BY

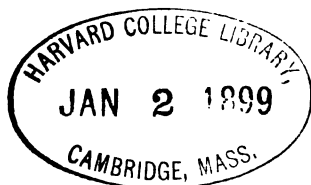
HERBERT E. TUTHERLY,

*Captain First U. S. Cavalry, Professor of Military Science and Tactics at the University of Vermont and on
Duty with the Vermont National Guard.*

Part I.

Burlington, Vt. :
Free Press Association,
1897.

~~VII. 197~~
Wat 458.97



K. S. Tutherly

PREFACE.

The following lectures have been prepared as a military science course in this University, to meet the requirements of the "theoretical instruction" prescribed in General Orders No. 93, Adjutant General's Office, series 1893, for institutions of learning receiving the detail of an Army Officer to act-as professor of military science and tactics. The lectures have been prepared upon the assumption that students have drilled one year and have become proficient in infantry drill regulations to include battalion movements, and in artillery drill regulations to include the "School of the Cannoneers." These lectures will be bound in three "parts," Part I being intended as a text-book for sophomores, Part II for juniors and Part III for seniors.

These books may also be found useful to National Guard Officers, and Non-commissioned Officers, as they constitute a progressive course, leading up from armory drill to battle tactics.

HERBERT E. TUTHERLY.

UNIVERSITY OF VERMONT, 1897.

Copyright 1897 by the Author.

PREFACE TO SECOND EDITION.

In this edition the three "PARTS" are bound as one book of 12 CHAPTERS for use as a text book for volunteer troops as well as national guardsmen and military colleges;—it having been suggested by officers who have used the separate "PARTS" of the first edition, that the twelve lectures, taken together, afford a complete elementary course for those who are hastily preparing for military service, and just what they need to go with "drill regulations. The appendix contains some practical lessons gathered from my recent service with our Army in Cuba.

H. E. TUTHERLY,

Captain 1st. U. S. Cavalry.

NOTE.—The second edition will be sold by the FREE PRESS ASSOCIATION at Burlington, Vt., at \$2.50 per copy, with discount to dealers or for quantities. This sample copy of a part of the book, (160 pages,) fairly represents the entire book (of 350 pages,) as pertains to illustrations and general method of treating subjects. A careful reading of this sample copy by those supervising military instruction of volunteer troops, national guard and military colleges, is invited. The text is the result of many years experience as military professor at colleges and with the national guard of states, as well as in the regular army. Any correspondence concerning the purchase of copies will receive attention by the FREE PRESS ASSOCIATION, Burlington, Vt.

H. E. T.

NOTE.

The following army text-books have been somewhat closely followed in the subjects treated, and should be available as books of reference, in connection with this elementary treatise, which can, at best, be considered only as a guide in the study of the Art of War :

U. S. Drill Regulations for Cavalry, Artillery and Infantry.

U. S. Guard Manual.

U. S. Army Regulations.

U. S. Army Annual Register.

U. S. Small Arms Firing Regulations, (Blunt.)

U. S. Regulations for Troops in Campaign.

U. S. Manual for Courts-martial, (Murray.)

U. S. Manual for Hospital Corps Drill.

U. S. Signal Manual.

U. S. Army Book of Uniforms (Hollabird.)

Tidball's Manual for Heavy Artillery.

Bruff's Ordnance and Gunnery.

Wagner's Organization and Tactics.

Wagner's Advance Guard and Outposts, (a catechism.)

Root's Military Topography and Sketching.

Military Field Engineering, (Beach.)

Elements of the Art of War, (Mercur.)

Military Hygiene, (Woodhull.)

Horses, Saddles and Bridles, (Carter.)

Farrow's Military Cyclopædia, (last edition.)

Contents of Part I.

- Lecture No. 1—Army Organization.
- Lecture No. 2—The Line of the Army.
- Lecture No. 3—The Staff Departments.
- Lecture No. 4—Military Discipline.

Contents of Part II.

- Lecture No. 5—Moving and Supplying Armies.
- Lecture No. 6—Castrametation.
- Lecture No. 7—Guard Duty.
- Lecture No. 8—Advance Guards and Outposts.

Contents of Part III.

- Lecture No. 9—Military Engineering.
- Lecture No. 10—Tactics.
- Lecture No. 11—Strategy.
- Lecture No. 12—Battle of Gettysburg.

LECTURE NO. 1.

Army Organization.

Armies are composed of the "*line*" and the "*staff*."

The "*line*" includes the three "arms," infantry, artillery and cavalry.

It comprises the fighting force or "combatants" so called in contra-distinction to the staff which comprises the administrative departments usually styled "non-combatants." There are the same grades of rank in the various staff departments as in the "line" and the officers and men of the staff departments are uniformed, armed and equipped, similarly to those of the line.

Engineer troops are organized as infantry and may practically be considered as troops of the "line," although technically they are comprised in one of the staff departments.

The supplies and munitions of war are furnished through the several staff departments.

The tactical formations and movements are prescribed in the three books entitled, infantry drill regulations, light artillery drill regulations, and cavalry drill regulations. Separate drill books for the heavy artillery, hospital corps, and signal corps are also published.

The army (line and staff together) is governed by one code of rules, styled "Army Regulations." All regulations for the army are prescribed by the Secretary of War, who is chief of staff to the President. Orders of the Secretary are recognized as coming from the President, who is the constitutional "commander-in-chief" of the land and naval forces. The President and Secretary of War are, however, both civil functionaries, and the direct military command is exercised by the senior general officer of the army.

ORGANIZATION U. S. ARMY. (PEACE FOOTING.)		Aggregate.
Staff.	General officers	10
	Military secretary	
	Aids-de-camp to general officers	
	Adjutant-General's Department	16
	Inspector-General's Department	7
	Judge-Advocate-General's Department	8
	Quartermaster's Department	138
	Subsistence Department	115
	Medical Department	908
	Pay Department	29
	Corps of Engineers	588
	Ordnance Department	632
	Signal Corps	60
	Post chaplains	30
	Chief of Record and Pension office	1
	First Regiment of Cavalry	626
	Second Regiment of Cavalry	647
	Third Regiment of Cavalry	635
	Fourth Regiment of Cavalry	626
	Fifth Regiment of Cavalry	628
	Sixth Regiment of Cavalry	633
	Seventh Regiment of Cavalry	638
	Eighth Regiment of Cavalry	651
	Ninth Regiment of Cavalry	612
	Tenth Regiment of Cavalry	610
	Aggregate of Cavalry	6,806
Line.	First Regiment of Artillery	838
	Second Regiment of Artillery	817
	Third Regiment of Artillery	837
	Fourth Regiment of Artillery	844
	Fifth Regiment of Artillery	822
	Aggregate of Artillery	4,158
	First Regiment of Infantry	553
	Second Regiment of Infantry	539
	Third Regiment of Infantry	520
	Fourth Regiment of Infantry	547
	Fifth Regiment of Infantry	546
	Sixth Regiment of Infantry	539
	Seventh Regiment of Infantry	524
	Eighth Regiment of Infantry	526
	Ninth Regiment of Infantry	511
	Tenth Regiment of Infantry	581
	Eleventh Regiment of Infantry	540
	Twelfth Regiment of Infantry	530
	Thirteenth Regiment of Infantry	528
	Fourteenth Regiment of Infantry	554
	Fifteenth Regiment of Infantry	490
	Sixteenth Regiment of Infantry	541
	Seventeenth Regiment of Infantry	543
	Eighteenth Regiment of Infantry	547
	Nineteenth Regiment of Infantry	543
	Twentieth Regiment of Infantry	544
	Twenty-first Regiment of Infantry	538
	Twenty-second Regiment of Infantry	531
	Twenty-third Regiment of Infantry	554
	Twenty-fourth Regiment of Infantry	553
	Twenty-fifth Regiment of Infantry	549
	Aggregate of infantry	13,471
	West Point detachments	212
	Guard at military prison	105
	Recruits at stations and en route	338
	Indian scouts	40
	Grand aggregate, officers and men	*27,172
	Military Academy Cadets	331
	Retired	1,631

* "Peace" Strength. It does not meet the requirements of the "Drill Regulations," in which organizations are considered at their maximum war strength, see following pages.

In peace times the regular army is not organized into larger bodies than regiments except when concentrated for field operations.

The functions of the various staff departments are as follows :

The *Adjutant General's Department*, is the department of orders, correspondence and records.

The *Inspector General's Department*, is the department which collects information concerning the discipline, drill and efficiency of troops, and examines official disbursements.

The *Quartermaster's Department*, supplies the clothing, tents, camp equipage, fuel, forage and barracks, and provides transportation, both by land and water.

The *Subsistence Department*, supplies the food for men (called rations).

The *Medical Department*, provides medicines and attendance, and has charge of the hospital and ambulance service.

The *Pay Department*, pays officers and men.

The *Ordnance Department*, supplies the small arms, cannons, ammunition and accoutrements.

The *Corps of Engineers* conducts the construction of forts, field works and bridges, railroads and wagon roads.

The *Signal Corps* conducts communication by telegraph, telephone, visual signals, balloons and carrier pigeons.

The *Judge Advocate's Department*, is the military law department,—has charge of court martial records, and advises the General in technical questions of law.

Although military rank is held in the various staff departments the same as in the "line," the command of troops is not exercised by staff officers outside of their own departments, unless they are put on duty under orders which especially so direct.

GRADES & RANK.

INSIGNIA. (ARMY.)

GRADE IN U.S. ARMY.	SHOULDER-STRAPS. (UNDRESS.)	EPAULETTES & SHOULDER-KNOTS. (FULL-DESS.)	SLEEVES - OVERCOAT.	CORRESPONDING GRADES IN U.S. NAVY.
1. GENERAL. (CEASED AT DEATH OF GEN. SHERMAN 1891.)				1. ADMIRAL. (CEASED AT DEATH OF ADL. PORTER, 1891.)
2. LIEUTENANT GENERAL.			SAME AS FOR GENERAL.	2. VICE-ADMIRAL. (CEASED AT DEATH OF V. ADL. ROWAN, 1890.)
3. MAJOR-GENERAL.			SAME AS FOR GENERAL.	3. REAR-ADMIRAL. (HIGHEST GRADE, 1872.)
4. BRIGADIER-GENERAL.			SAME AS FOR GENERAL.	4. COMMODORE.
5. COLONEL.				5. CAPTAIN.
6. LIEUTENANT-COLONEL.	 (SILVER LEAF.)			6. COMMANDER. (SILVER LEAF.)
7. MAJOR.	 (GOLD LEAF.)			7. LIEUT. COMMANDER. (GOLD LEAF.)
8. CAPTAIN.				8. LIEUTENANT.
9. FIRST-LIEUTENANT.				9. LIEUTENANT.
10. SECOND-LIEUTENANT.				10. ENSIGN.

GRADES & RANK.

11 CADET.		CAPTAIN.		ADJUTANT.		QUARTERMASTER.		LIEUTENANT.		
		SGT-MAJOR.		Q.M. SERGEANT.		1 ST SGT.		SERGEANT.		(With Below Elbow) CORPORAL.
12. SERGEANT-MAJOR.			13. Q.M. SERGEANT.							
14		ORDNANCE-SERGEANT.		COM'Y. SGT.		POST Q.M. SGT.		HOS'L. STEWARD.		(NO CHEVRON)
	CHIEF-TRUMPETER.	PRINCIPAL-MUSICIAN.	SADDLER-SGT.	CHIEF-MUSICIAN						
15.		1 ST SERGEANT.		SIGNAL-SGT. 1 ST CLASS		SIGL-SGT. 2 ND CLASS.		COLOR-SGT.		SERGEANT.
17. CORP'L.				ACT. HOSPL. ST'D.		LANCE CORP'L.		FARRIER.		PIONEER.
				SERVICE-PEACE.		SERVICE-WAR.		SIGL CORPS.		BRASSARD.

General officers (only) wear the sash which is of buff silk. Those above the grade of brigadier-general may, at their option, wear the sash across the body from the left shoulder to the right side.

Chaplains wear plain black clothing without shoulder insignia.

General officers, officers of the staff departments and enlisted men of the engineer corps, wear dark blue coats and trousers.

Officers and men of the line and men of the staff departments, except engineers, wear dark blue coats and sky blue trousers.

The colors of trimmings (chevrons, shoulder insignia, stripes, plumes, etc.) of the three "arms" are as follows: infantry, white; artillery, red; cavalry, yellow.

The color of the cadet uniform is gray, with black stripes, and gilt chevrons.

Enlisted men of the hospital corps wear green stripes and chevrons, and the hospital corps insignia is a "red cross."

The colors of stripes and chevrons for enlisted men of staff departments are as follows:

Engineers, scarlet, piped with white; ordnance, crimson; post-quarter-master sergeants, buff; commissary sergeants, gray.

The term "officer" is applied to only those in the military service who hold a commission from the government, and includes the grades from that of general to that of second lieutenant. They hold their commissions for life.

The term "cadet" is applied to students at the United States Military Academy at West Point, who are undergoing a course of instruction preparatory to becoming officers. "Cadet" is the grade just below that of second lieutenant.

The term, "enlisted man," is applied to all in the military service, below the grade of cadet and who enlist for a term of years.

Enlisted men in the military service, holding the grades from sergeant-major to corporal, are designated non-commissioned officers.

The following are the commands appropriate to each grade of officers:

Lieutenant, a platoon.

Captain, a company of infantry, troop of cavalry, or battery of artillery.

Major, a battalion of infantry or artillery, or a squadron of cavalry.

Colonel, a regiment. (Lieutenant-colonel assists the colonel.)

Brigadier-general, a brigade.

Major-general, a division.

Lieutenant-general, a corps.

General, a separate army.

A lieutenant-general is authorized to select from officers of the army two aides-de-camp, and a military secretary who rank as lieutenant-colonels while so serving.

A major-general may select three aides-de-camp from the captains or lieutenants of the army.

A brigadier-general may select two aides-de-camp from the lieutenants of the army.

These aides constitute the general officer's personal staff, or as sometimes designated, his "military family." They ride next to him on occasions of ceremony and represent him personally on the field of battle.

Each general officer has besides "aides" an administrative staff made up by detailing officers for this purpose from the several staff departments, e. g., the staff of a general officer commanding a corps would naturally be as follows :

Three aides-de-camp.

One adjutant-general, chief of staff.

One inspector general.

One judge advocate general.

One chief quartermaster.

One chief commissary of subsistence.

One chief paymaster.

One medical director.

One provost-marshal general.

One chief engineer officer.

One chief ordnance officer.

One chief signal officer.

One chief of artillery.

One chief of cavalry.

Each of these staff officers may, and usually does, have assistants, but he himself superintends the duties pertaining to his department within the command and leaves the general free to exercise his higher functions of command and devote himself to the general policy and plans of campaigns.

Division and brigade commanders each have a similar staff to that prescribed above for the corps commander, however, unless a division or brigade is serving

as an independent command the commander does not require a chief of artillery, chief of cavalry, provost marshal, or chief signal officer, and the brigade staff may be much more reduced.

Smaller commanders than generals have corresponding staffs, the members of which exercise the functions corresponding to those upon a general's staff.

The commanding officer of a regiment has, as a staff, an adjutant, a quartermaster, and, in the field, a commissary, each with the rank of first lieutenant; a surgeon, usually ranking as major, and one or two assistant surgeons, ranking as either captains or lieutenants. He also has a chaplain, whose nominal rank is that of captain.

The regimental non-commissioned staff consists of a sergeant-major, quartermaster-sergeant, a chief musician (2 principal musicians in infantry or artillery), (a chief trumpeter and saddler-sergeant in cavalry), three hospital stewards, a commissary sergeant, and acting hospital steward.

A major in command of a battalion or squadron, has an adjutant, whose rank is lieutenant, and a sergeant major; and, when serving independently, he also details one of the lieutenants of his command as quartermaster and commissary, and has an assistant surgeon assigned from the medical department. He would also detail sergeants of his command to act as quartermaster sergeant and commissary sergeant, and he would have a hospital steward assigned from the hospital corps.

As a rule the staff officers of a colonel rank as first lieutenants; of a brigadier-general as captains; of a major-general as majors; of a lieutenant-general as lieutenant-colonels; of a general as colonels; while the "chiefs" of the various staff departments rank as brigadier-generals.

These "chiefs" constitute the military staff of the President, with the Secretary of War at the head as chief of staff, and have their bureaus in the War Department at Washington.

The company in infantry, the troop in cavalry, and the battery in artillery, are the units of organization in the respective arms.

The war footing of a company of infantry or troop of cavalry is three officers and one hundred and three enlisted men each. Of a battery of artillery six officers and one hundred and seventy-six enlisted men.

These are, however, reduced in peace times, as may be found necessary and expedient, sometimes to as low a maximum company strength as three officers and fifty men.

The student will find in the drill regulations of the three "arms" how these company units are grouped into the larger units, and these again into still larger ones, each group responding to the will of one special commander, steps being thus formed, so to speak, by which the will of the commander of an army can descend to control each private in ranks.

TACTICAL UNITS.—(*War Footing*).

INFANTRY.

<i>Company.</i>	<i>Battalion.</i>	<i>Regiment.</i>	<i>Brigade.</i>	
1 Captain,	1 Major,	1 Colonel,	1 Brigadier Gen.,	} Staff. N. C. Staff.
1 1st Lieutenant,	1 Adjutant (Lieut.),	1 Lt. Colonel,	2 Aides,	
1 2d Lieutenant,	1 Sergeant-Major,	1 Adjutant (Lieut)	1 Ass' Ad'jt Gen.,	
1 1st Sergeant,	424 = 4 Companies.	1 Quarterm'r "	1 Brig. Q. M.,	
4 Sergeants,	—	1 Commissary "	1 " Com'y,	
12 Corporals,	427 Officers and men.	1 Surgeon (Maj.)	1 " Surgeon,	
2 Musicians	—	1 Ass't " (Capt.)	1 " Q. M. Sgt.,	
84 Privates.	1 6-mule wagon,	1 " " (1st Lt.)	1 " Com'y "	
—	1 2-Horse ambu-	1 Chaplain,	1 " Hosp'l St'd,	
106 Officers and men.	lance.	1 Sergeant Major,	2 Messengers,	
—	—	1 Q. M. Sergeant,	2 Clerks,	
1 6-mule wagon if	—	1 Com'y "	1 Pvt Hosp'l Corps,	
the Company serves	—	3 Hosp'l Stewards,	3918 = 3 Regiments.	
alone.	—	1 Act'g Hosp'l "	—	
	—	1 Chief Musician,	3933 Officers and men,	
	—	2 Principal "	—	
	—	6 Pvts Hosp Corps,	15 6-m. Reg. wagons,	} Staff. N. C. Staff.
	—	1281 = 3 Battalions.	2 4-m. " "	
	—	1806 Officers and men.	2 6-m. H'q's "	
	—	—	9 Reg'l ambulances,	
	—	3 Battalion wagons,	2 H'qrs ambulances.	
	—	1 H'qrs wagon,	—	
	—	1 Medicine "	30 Carriages.	
	—	2 Ammunition wag-	—	
	—	ons (4-mule),	—	
	—	3 Ambulances.	—	
	—	10 Carriages.	—	

CAVALRY.

<i>Troop.</i>	<i>Squadron.</i>	<i>Regiment.</i>	<i>Larger Units.</i>
1 Captain,	1 Major,	1 Colonel,	Larger units than
1 1st Lieutenant,	1 Adj't (Lieut.),	1 Lieut. Colonel,	regiments usually have
1 2d Lieutenant,	1 Serg't Major,	1 Adj't (1st Lieut.),	horse artillery added,
1 1st Sergeant.	424 = 4 Troops.	1 Q. M. "	e. g.:
1 Q. M. Sergeant,	—	1 Com'y "	—
5 Sergeants,	427 Officers and men.	1 Surgeon (Major),	Cavalry Brigade =
7 Corporals,	—	1 Ass't " (Capt.),	3 regiments of cav-
2 Trumpeters,	2 to 4 6 mule wagons,	1 " " (1st Lt.),	alry and 1 battery of
2 Farriers,	1 Ambulance.	1 Chaplain,	horse artillery.
1 Saddler,	—	1 Vet'y Surgeon,	—
1 Wagoner,	3 Carriages, or more,	1 Sg't Major,	Cavalry Division =
83 Privates.	depending upon the	1 Q. M. Sergeant,	3 brigades of cavalry
—	amount of forage to	1 Com'y "	and 1 battalion of
106 Officers and men.	be carried.	3 Hosp'l Stewards,	horse artillery.
—	—	1 Act'g Steward,	—
1 or 2 6-mule wag-	—	1 Chief Musician,	Cavalry Corps =
ons, depending upon	—	1 Saddle Sergeant,	3 cavalry divisions
the amount of forage	—	1 Chief Trumpeter,	and 6 batteries of
necessary to carry.	—	12 Pvts. Hosp'l Corps.	horse artillery.
	—	1281 = 3 Squadrons.	—
	—	1313 Officers and men.	—
	—	—	—
	—	7 Carriages or more,	—
	—	as necessary.	—

ARTILLERY.

Artillery is divided into *light artillery* and *heavy artillery*.

Light Artillery.

Light artillery comprises "*horse*" artillery in which each cannoneer is mounted on horseback, for service with cavalry, and "*field*" artillery in which cannoneers ride on the carriages, ammunition chests or "off" horses.

<i>Battery.</i>	<i>Battalion.</i>	<i>Regiment.</i>	<i>Brigade.</i>
		(The regiment is only an administrative unit. The light artillery usually moves by battalions.)	
1 Captain,	1 Major,	1 Colonel,	} Usually not Brigaded.
2 1st Lieutenants,	1 Adjutant, (Lieut.),	1 Lieutenant-Colonel,	
2 2d Lieutenants,	1 Sergeant Major,	1 Adj't (1st Lieut.),	
1 Ass't Surg. (Lieut.),	1 Q. M. Sergeant,	1 Quarterm'r "	
1 1st Sergeant,	1 Chief Trumpeter,	1 Commissary "	
1 Q. M. Sergeant,	728 — 4 Batteries.	1 Surgeon, (Maj.),	
1 Veterinary Serg't,	—	1 Chaplain,	
6 Sergeants,	733 Officers and men.	1 Sergeant-Major,	
15 Corporals,		1 Q. M. Sergeant,	
5 Artificers,	24 Guns,	1 Comm'y Sergeant,	
2 Trumpeters,	44 Other carriages.	3 Hospital Stewards,	
1 Guidon,		1 Act'g "	
1 Wagoner,		1 Chief Musician,	
48 Drivers,		2 Principal "	
84 Cannoneers,		3 Battalions of 4 bat-	
8 Supernu'ry Drivers,		teries each. (Part of	
2 Range Finders,		these may be "light"	
1 Pvt. of Hosp. Corps.		and part "heavy" bat-	
—		teries.)	
182 Officers and men.		72 Guns.	
6 Guns,			
11 Other carriages.			

Heavy Artillery.

Heavy artillery embraces batteries used for siege and *sea coast* service. The heavy batteries are armed and drilled as infantry, in addition to special tactics for heavy ordnance.

ENGINEER TROOPS.

Engineer troops are organized into companies and battalions and armed as infantry, with 4 officers and 150 men in a company and 4 companies in a battalion. They perform the duties of sappers and miners and pontoniers. They also serve in sea-coast defences and have charge of the torpedo service.

SIGNAL TROOPS.

A company of signal troops,—5 officers and 175 men,—is attached to each corps, and has with it material for 50 miles of portable telegraph line, carried in four wire wagons, four lance trucks and one battery wagon.

HOSPITAL CORPS.

The "hospital corps" comprises the enlisted men of the medical department—hospital stewards, acting hospital stewards and privates.—These men are organized into bearer companies—60 men each—ambulance companies—72 men each—and field hospital detachments—40 men each—under officers of the medical department.

*THE DIVISION.

	Officers.	Medical Officers.	Non-Commissioned Officers and Privates.			Aggregate.	Guns.	Other Carriages.	Horses.	Mules.	Total Animals.
			Combatants.	Non-Combatants.	Total.						
C. O. and Staff.....	11	1	22	22	34	3	28	18	46		
Three Infantry Brigades.....	405	30	11,142	222	11,364	11,799	69	258	378	636	
Four Batteries.....	22	4	703	4	707	733	24	44	635	635	
Bearer Co.....	3	3	60	60	63	4	12	12	24		
Ambulance Co.....	3	3	72	72	75	53	118	18	136		
Field Hospital.....	3	3	40	40	43	7	12	30	42		
Grand Total.....	438	44	11,845	420	12,265	12,747	24	180	1,063	456	1,519

When a division serves as an independent command, at least 1 squadron of cavalry and 2 or 4 batteries of artillery should be added.

*THE ARMY CORPS.

	Officers.	Medical Officers.	Non-Commissioned Officers and Privates.			Aggregate.	Guns.	Other Carriages.	Horses.	Mules.	Total Animals.
			Combatants.	Non-Combatants.	Total.						
C. O. and Staff.....	15	1	31	31	47	6	37	37	73		
Three Divisions.....	1,314	132	35,535	1,260	36,795	38,241	72	540	3,189	1,368	4,557
Corps Artillery.....	48	8	1,409	8	1,417	1,473	48	88	1,386	1,386	
Cavalry.....	43	3	1,239	28	1,267	1,313	7	1,359	40	1,399	
Engineers.....	19	1	601	7	608	628	58	12	338	350	
Signal Corps.....	5	1	175	175	181	9	38	38	38		
Hospital Reserve.....	3	3	40	40	43	7	12	30	42		
Ammunition Col.....	10	2	350	350	362	121	332	420	752		
Supply Train.....	24	2	774	774	900	469	153	2,814	2,967		
Horse Depot.....	3	3	100	100	103	1	106	100	206		
Grand Total.....	1,481	153	38,784	2,773	41,557	43,191	120	1,306	6,624	5,146	11,770

Two clerks and 2 messengers are allowed to each brigade headquarters; 12 clerks and 5 messengers to each division; and 18 clerks and 8 messengers to each corps. Each paymaster is also allowed 1 clerk.

*Wagner's Organization and Tactics.

A SEPARATE ARMY IN THE FIELD.

Two, three or more corps are united to form a separate army in the field. These armies take the designations of the sections of the country in which they are operating, *e. g.*: "Army of the Potomac," "Army of the Cumberland," "Army of the Mississippi," etc., in the War of Secession.

ARMY OF THE UNITED STATES.

The separate armies making up the military force of the nation are under the command of a general-in-chief who, properly, should have a higher grade than general, *e. g.*: marshal or captain-general. However, in the United States no higher grade than that of general has been created. Washington, Grant, Sherman and Sheridan are the only officers who have attained that grade, and these with Schofield are the only ones who have held the full rank of lieutenant-general. The command of our army has usually been held by the senior major-general.

LECTURE NO. 2.

The Line of the Army.

The general officers and regiments of infantry, cavalry and artillery comprise what is technically termed the "line" of the army. Regiments are not brigaded except as they concentrate for field operations. As they arrive at the place of concentration they are assigned to brigades by the commanding general, or such officer as may be designated to organize the expedition, who assigns a brigadier general to command each brigade, if officers of that grade be available, otherwise the senior officer of the brigade would be its proper commander.

Brigades will ordinarily be composed of troops of one arm of the service, however detachments of the several arms coming together are frequently organized as a brigade.

The brigade, when constituting part of a division, is only a tactical unit, and requires only the staff, non-commissioned staff, messengers, clerks, etc., indicated under the heading **Infantry—War Footing*.

When acting separately, the brigade has such other staff officers as are deemed necessary by the authority creating it.

The division is the basis of organization in an army, and is both a tactical and administrative unit, commanded by a major-general or the senior brigadier-general present. Supplies are purchased by division staff officers upon the orders of the division commander (or procured from depots by requisitions approved by the division commander) and distributed direct to regiments and by regimental staff officers, issued direct to captains of companies, troops or batteries upon requisitions approved by regimental commanders.

Army corps are only organized by special authority from the President, and corps commanders are designated by the President, as are also those of separate

*Lecture No. 1, page 13.

armies. Both are usually selected from major-generals, as the higher grades—general and lieutenant-general—have only occasionally been filled in our army.

This latter practice, however, is in violation of the well-known military principle that each unit should have a recognized chief with a particular grade, and history contains many illustrations of evil results therefrom. *In Napoleon's armies, the generals cheerfully served under marshals, and the marshals loyally obeyed the orders of the Emperor; but the conduct of marshals serving under marshals was often insubordinate, and not infrequently led to disaster."

In the War of Secession in this country the same embarrassments to military operations were experienced by requiring general officers to serve under the orders of commanders holding the same grade with themselves.

Brigades in divisions, and divisions in army corps, receive numerical designations upon their organization; as "first brigade, second division;" "third division first army corps," etc. Army corps are numbered in the order of their organization.

Temporary organizations consisting of more than one division, as wings, centers, and reserves may be formed under temporary commanders, but such temporary commanders will not interfere with the organization or administration of the divisions thus united, and will only direct their movements in marches and on the field of battle. All staff officers who are not otherwise employed at the time act as "aides" to their commanding general on the field of battle.

UNIFORMS.

The uniform is as important a factor in accomplishing discipline as the drill, and no time should be lost in putting upon every officer and man who enters the service, a neat and comfortably fitting uniform. The brassard on the sleeve of the company litter bearer and the horse shoe on the troop farrier's sleeve are as necessary as the epaulette and sash of the general officer, and the same soldierly pride must be developed in the private before he will receive his corporal's chevron that brings the general officer out from the list of colonels.

*Wagner's Organization and Tactics, page 36.

The subject of uniforms has been sufficiently discussed and illustrated in the previous *lecture to enable the student to distinguish rank and "arms" of the service by the most conspicuous marks, viz: shoulder insignia for officers, sleeve chevrons for enlisted men and the colors of trimmings for the various "arms."

Each button on the uniform has its useful significance, and by the various badges and marks the commander can tell just where each individual of his army belongs in an extended line of battle. The practical military student should make himself further conversant with the subject by a careful study of the illustrated book of uniforms published by the quartermaster-general of the army.

The "full dress" uniform is only worn upon occasions of ceremony; the "undress" uniform is the one habitually worn in garrison and the only one worn upon campaigns.

GENERAL OFFICERS.

The term "general officers" in the organization table comprises the four grades, general, lieutenant-general, major-general and brigadier general—those officers who are assignable to command troops of the line—they are in fact "line" officers. The President in making these appointments has usually confined selections to colonels of infantry, cavalry or artillery. They must be conversant with the details of all "arms" and departments, and broadly educated to properly fill their positions, as commanding an army is as great an enterprise as man is ever called to conduct.

The grade of brigadier general is also given to the highest officer (chief) of each staff department. He wears the uniform of the grade, but with the distinguishing badge of his staff department, and is not included in the organization table under the heading "general officers."

*Pages 8, 9 and 10.

†General officers are selected by the President from lower grades, while, up to include the grade of colonel, promotion is by seniority.

PROPORTIONS OF THE THREE ARMS.

The proportions of the three arms of the service, making up larger units than brigades depend upon the nature of the service, but as a rule the *strength of the cavalry contingent has in times past been estimated from one-fourth to one-fifth, and the artillery about one-seventh of that of the infantry. However, with the modern extended lines of infantry and their improved weapons the proportion of cavalry will probably be considerably greater in future wars. The proportion of artillery may also be approximately indicated as from three to four guns to each thousand men of other arms, when operating in a country free from mountains and with good roads, but reduced in proportion as the roads are poor.

INFANTRY.

As heretofore indicated, the infantry comprises about three-fourths of all armies, and for that reason it may be considered as the most important arm; still it is difficult to rate the relative importance of three arms which are almost inseparable parts of an effective organization.

The infantry will, however, be the arm receiving our most detailed discussion, as it is the arm to which practical instruction is most generally confined in schools and colleges, and the one also covering nine-tenths of the national guard service; cavalry and artillery being expensive arms to maintain and almost impracticable at most colleges on account of the number of horses necessary, and for a similar reason difficult to maintain in the national guard service of the states.

From a disciplinary point of view all that applies to the infantry applies to any arms of the service, and the administration of affairs is practically the same in all. Even the science of gunnery must be known to the infantryman, the cavalryman and the artilleryman alike. The infantryman has with his modern long range rifle the opportunity to apply highly scientific knowledge to be able to make his rifle do execution two miles away. (The infantry rifle is now sighted for two thousand yards, and will inflict a deadly wound at the distance of two

*Napoleon's rule.

miles.) The infantryman carries but one weapon—the rifle, which has a detachable bayonet, making it either a projectile weapon for long range or a pike for close combat.

Figure 1 shows the infantry soldier equipped for field service—in what is known as heavy marching order. The knapsack, or as it is now called, the

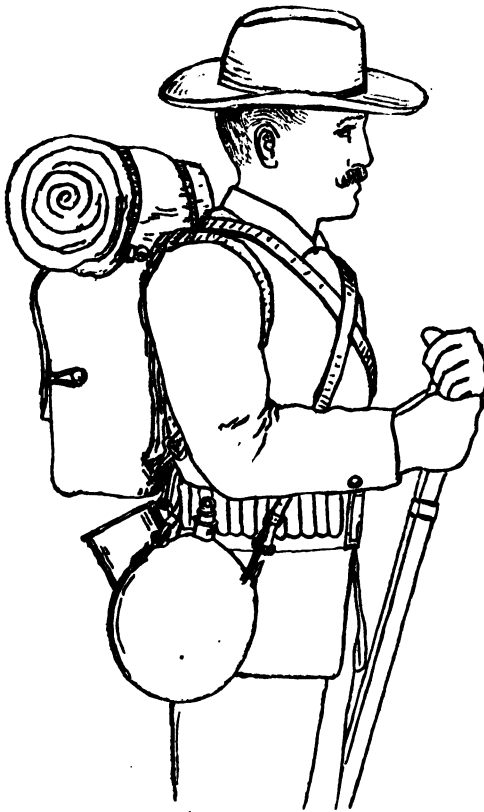


Fig. 1.

blanket bag, is strapped to the soldier's back. In it are carried the blanket and other spare clothing. The overcoat, when not worn, is rolled in the half of a shelter tent, carried by each man, and strapped on top of the blanket bag. A tin cup is hung under the blanket bag. The canteen filled with water is slung on the right side, and the haversack, containing the rations, meat ration-can, knife, fork and spoon, is slung on the left side. The cartridges are carried in a *thimble belt* worn at the waist. The bayonet scabbard is attached to the belt on the left side. The field uniform consists of the undress blouse and trousers, soft drab campaign hat and an overcoat which has a cape.

The following is the approximate weight carried by the U. S. Infantry soldier :

rifle and bayonet	9.50 lbs.
belt50 lbs.
100 rounds ammunition	8.00 lbs.
	————— 18.00 lbs.

2 days' rations	5.30 lbs.
utensils	3.00 lbs.
canteen filled	3.75 lbs.
	———— 12.05 lbs.
1 piece shelter tent	2.00 lbs.
1 blanket	5.20 lbs.
1 overcoat	8.50 lbs.
1 pair shoes	3.00 lbs.
1 pair drawers.....	.75 lbs.
1 shirt.....	1.00 lbs.
1 pair stockings.....	.25 lbs.
	———— 20.70 lbs.
Total weight.....	50.75 lbs.



Fig. 2.

Figure 2 illustrates the blanket roll used for carrying the soldier's baggage instead of the blanket bag. Although this method has not been officially adopted, as a matter of practice it is frequently used in active service. Even with only a few straps and blanket pins, or with strong twine the soldier may improvise this roll, leaving the shelter tent on the outside to keep the clothing dry.

The roll is worn from the left shoulder to the right side, and with the "roll," the haversack and canteen are hung from the right shoulder to the left side. The figure also illustrates the white helmet worn in hot climates instead of the campaign hat.

RIFLE PITS.



Fig. 3.

Figure 3 illustrates a rifle pit which is the simplest of earth works—a hole dug in the ground with the earth thrown on the side toward the enemy, so that men stand, kneel or lie down in the hole, and obtain shelter both from the earth that is thrown out and that which forms the side of the hole.

All soldiers should be frequently drilled in throwing up this hasty shelter. To do this the instructor first lays out the line that the trench is to assume, not straight, but determined by the nature of the ground so as to secure natural cover. The men stack or ground arms and throw the earth to the front with such implements as they have so as to form a parapet; available turf, rocks and logs being used as revetment.

A trench two feet wide and fifteen inches deep shelters one man kneeling and another lying down in rear on the natural surface of the ground; if the trench be four and one-half feet wide it will cover two ranks kneeling, and if the trench be seven feet wide the men can lie down in it.

The infantry of most nations are adopting some kind of intrenching tool for each man to carry, and in some European armies one man of each squad carries a small shovel hung to his belt. Our new magazine rifle has a knife bayonet which is intended for this use. Troops in the War of Secession learned to scrape up hasty intrenchments with the tin cup and triangular bayonet within a few moments after halting, and by the use of the axes and shovels carried in the wagons, these trenches would be deepened and broadened and revetted with logs so as to furnish complete shelter against both infantry and artillery within a few hours after troops went into camp.

In the wars of the future even more importance will be attached to shelter on account of the increased range and rapid fire of small arms, and especially the

terrible slaughter possible among troops, in masses, from the fire of machine guns.

MACHINE GUNS.

It is believed by many that machine guns will eventually become component parts of the equipment of every infantry and cavalry command in the field, and play a most important part in future warfare, but their tactical use must be developed by experience. There are many types of these guns.

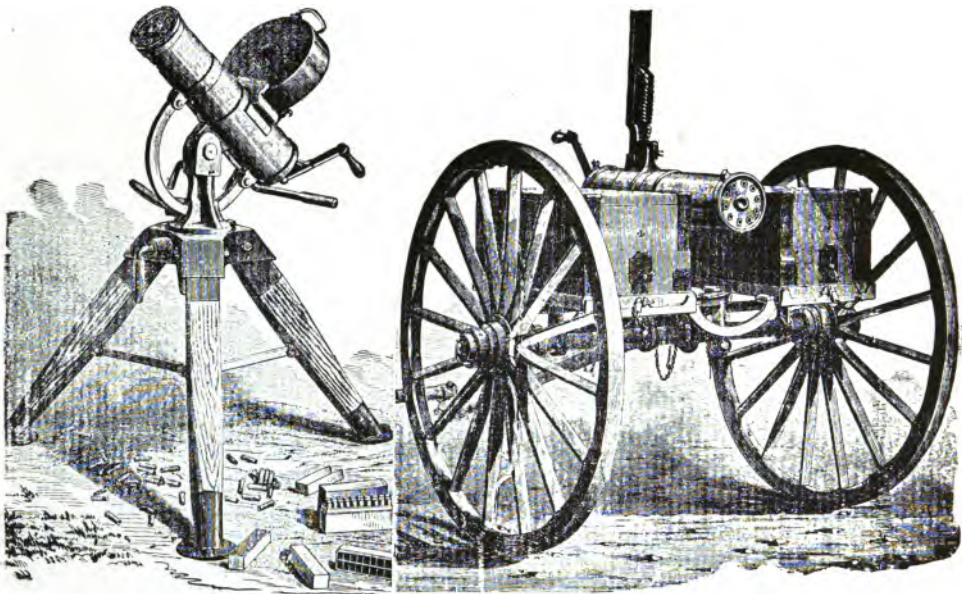


Fig. 4.

Figure 4 illustrates the musket calibre ten-barrelled gatling gun for use with infantry or cavalry. This gun may be drawn by either one or two horses. It is operated by a crank at the breech and fires 1,000 rounds per minute. The weight is only 150 pounds, so that it may be transported upon the back of a mule and fired from a tripod.

INFANTRY ACTION.

Infantry action consists of fire, shock, and a combination of the two. The actual shock rarely occurs, as one line or the other usually gives way before the bayonets meet, but the moral effect decides the battle, and the resultant of suc-

cessful fire action is the bayonet charge. Some have advocated abolishing the bayonet, but its moral effect both in actual charge and in the feeling that a command is not totally helpless when ammunition is exhausted, more than compensate for the slight weight of the bayonet. Men should be trained in the "bayonet exercise" as well as to fire the piece effectively at a target.

*"The fire of the breech-loading rifle is sensibly felt at a distance of more than 2,500 yards, and becomes serious at nearly 1,700 yards, but it is only at 1,000 yards that the fire becomes really effective. At 500 yards it can be called "decisive," while at 300 yards and under, it is practically annihilating."

CAVALRY.

Cavalry is expensive to equip and maintain, and requires a long course of training to become effective. For this reason European nations keep their cavalry nearly up to the war strength at all times.

It was not until near the close of the War of Secession that our cavalry became effectively organized to serve its fullest functions as an independent fighting force, and the developments of that war practically transformed all of our cavalry into dragoons; dragoons being mounted troops armed and trained to fight on foot with effective fire action, and also to give effective shock action by charging with the saber.

†"The dragoon is essentially the cavalry-man of the present day, and the American cavalry-man of 1864-5 is the type to which all European mounted troops are more or less reluctantly, or perhaps more or less unconsciously approaching."

Our cavalry-man has three weapons, a carbine, a saber and a revolver.

*Wagner's Organization and Tactics, page 47.

†Wagner's Organization and Tactics, page 52.

Figure 5 illustrates the cavalry trooper equipped for field service.

The carbine is attached to a sling worn from the left shoulder to the right side, and when not required for use the carbine is thrust into a boot attached to the saddle in rear of the right thigh.

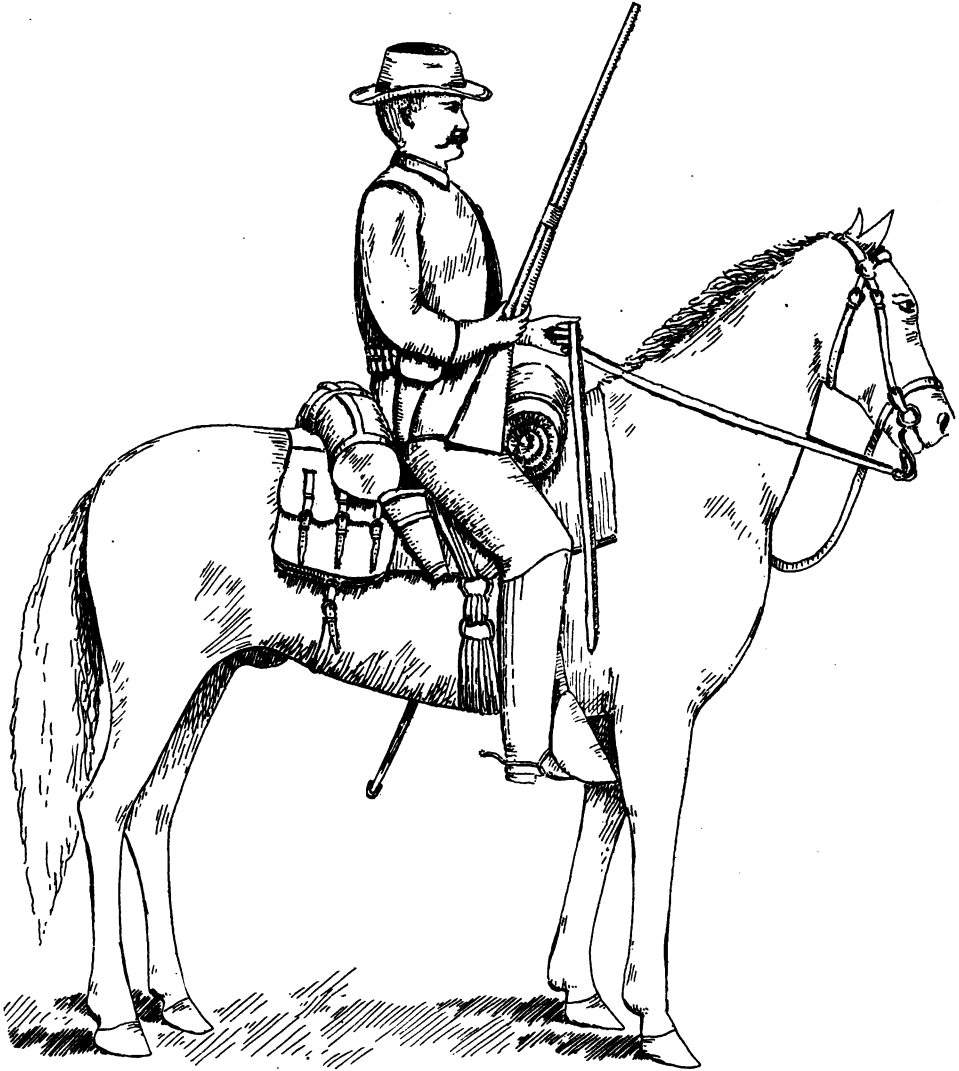


Fig. 5.

The pistol-holster is attached to the cartridge belt on the right side. The saber (the only one being visible in the picture) is suspended from the saddle on

the left side. The overcoat when not worn is rolled and strapped in front on the *pommel of the saddle. The saddle-bags are attached to the *candle of the saddle, the "off" one carrying the *tin plate* or *meat can*, *knife*, *fork* and *spoon*, and the "near" one the *curry comb*, *brush*, *watering bridle* and two extra horse shoes (fitted), with the extra ammunition and rations divided so as to equalize the weight of the saddle-bags.

The canteen and tin cup are attached to the "near" or "off" candle ring. The bed blanket with change of underclothing inside, is rolled in the half of a shelter tent and strapped behind the candle.

The *side lines* or *hobbles* are lashed on top and the nose-bag drawn over one end of the blanket roll, the *lariat* rolled around the picket pin is snapped into the near candle ring.

The saddle blanket is folded into six thicknesses and placed on the horse's back under the saddle. The surcingle is buckled over the saddle. The halter is left on the horse's head under the bridle and the hitching-strap tied around the horse's neck or to the near side of the pommel of the saddle.

The illustration shows the soldier at the position of "raise carbine." The carbine is similar in mechanism to the infantry rifle, except that it is ten inches shorter and has no bayonet. It has an effective range of about eight hundred yards against one thousand yards for the rifle and may be sensibly felt at about three-quarters of a mile. Colt's six chambered revolver, calibre .38 is the model now in the hands of our cavalry. Its total length, including barrel, chamber and stock is about one foot.

The requirements of instruction are of a more exacting character than in the infantry, arising not only from the three weapons that the cavalryman uses, but from his necessary instruction in riding, the care of his horse, escort and vidette duties, and in fighting both mounted and dismounted. The cavalry has been denominated the "eyes and ears" of an army, and upon the outbreak of hostilities is needed at once. It acts as a screen for many miles in advance of the main force, and its efficiency depends upon the energy, dash and judgment of its

*The "pommel" is the front part of the saddle; the "candle" the back part.

leaders as well as upon thorough discipline secured by long and persistent instruction.

ARTILLERY.

The artillery is the most scientific arm of the service, and requires not only officers technically educated but also skilled men as cannoneers. Its general classification into "light" and "heavy," and its organization have been given in the previous* lecture, and only sufficient details will be added here to acquaint the student in a general way, with artillery armament and equipment.

CANNON.

The cannon is the distinctive weapon of artillery, and technically spoken of as a "*gun*." It is habitually fired from a carriage in contra-distinction to the hand arms with which infantry and cavalry do their fighting. Cannoneers of light artillery are, however, provided with small arms for individual defence and for guard duty; sergeants being armed with the saber and revolver, and other men with the revolver. The men of heavy artillery are armed and equipped as infantry.

As with small arms so with cannon, we may consider muzzle loading and smooth bore guns, with which the War of Secession was fought, as obsolete, and only treat breech loading rifled guns.

The following table gives the breech-loading rifled ordnance now in use.

CALIBERS.	Weight.	CHARGE.		Initial velocity.
		Powder.	Projectile.	
MOUNTAIN AND FIELD ARTILLERY.	Pounds.	Pounds.	Pounds.	Feet.
3-inch Mountain gun, steel	218	0.88	12.	870.
3.2-inch Light field gun, steel.....	829	3.75	13-5	1675.
3.6-inch Field gun, steel.....	1181	4.50	20.	1554.
3.6 inch Field mortar, steel.....	244	1.00	20.	650.
SIEGE ARTILLERY.				
5-inch guns, steel.....	3660	12.50	45.	1830.
7-inch howitzer, steel	3710	9 75	105.	1085.
SEA-COAST ARTILLERY.	Tons.			
8-inch gun, steel.....	14.5	130.	300.	1935.
10-inch gun, "	30.0	256.	575.	1940.
12-inch gun, "	52.0	440.	1000.	1940.
12-inch mortar, cast-iron, steel hooped.....	15.25	80.	630.	1152.
12-inch mortar, steel.....	13.0	100.	800.	1150.

*Page 14.

Figure 6 illustrates the construction and breech mechanism of our field, siege and sea-coast guns, which are of built-up steel. The general system of construction consists in shrinking on to a tube a succession of jackets and hoops, the one over the other. The breech mechanism is known as the "interrupted screw." It is practically the French system, while the Germans have the wedge system. As shown in the above table, cannon are classified as "field," "siege" and "sea-coast" guns, and in addition to the guns proper there are mortars belonging to the different classes:

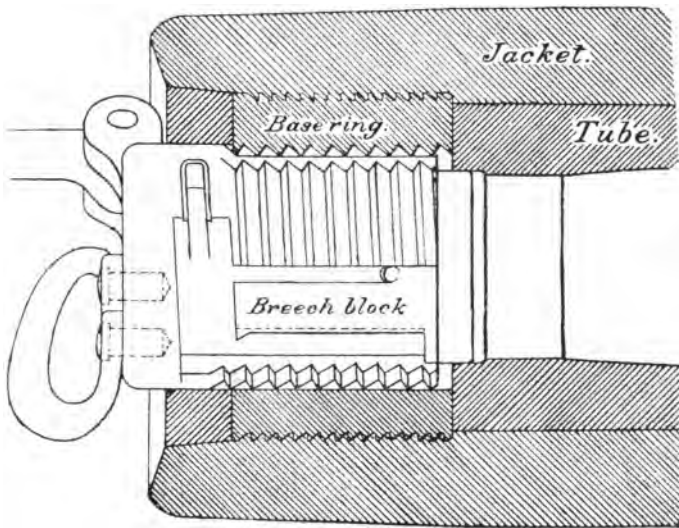


Fig. 6.

LIGHT ARTILLERY.

A field battery equipped with 3.2-inch guns is called a "light field battery;" one equipped with 3.6 inch guns is called a "heavy field battery;" and one equipped with 3-inch guns is called a "mountain battery." All of these classes of guns are mounted on carriages similar in construction, only differing in size to meet the varying sizes of the guns, and the carriage of each gun is attached to a "limber" which contains an ammunition chest, the whole, limber and gun-carriage, when the gun-carriage is "limbered up," constituting one vehicle drawn by six

horses. There is also with each gun an extra four wheeled carriage called a "caisson" for carrying the necessary supply of ammunition, extra parts, etc. This is also drawn by six horses, so that twelve horses are required for drawing each field artillery gun and caisson, besides the saddle horses ridden by the sergeant who is chief of piece, and the corporal who is chief of caisson; making fourteen horses in all for each gun. In horse artillery ten extra horses are required for mounting the cannoneers of each gun detachment.

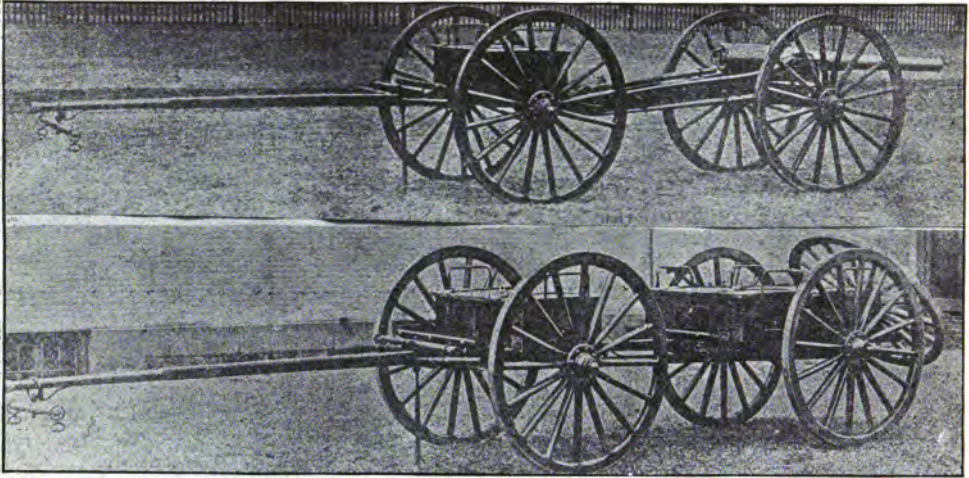


Fig. 7.

Figure 7 illustrates a field piece with its carriage "limbered up" and its caisson, and Figure 8 shows the *horses attached to a caisson with the drivers standing at the heads of the "near" horses. Each driver manages a pair of horses by riding the "near" one of the pair, and the three pairs attached to each carriage constitute one "team." Each horse is saddled like the cavalry horse in addition to wearing the harness necessary to draw the carriage to which he is attached.

†Six guns with their caissons, three extra caissons, a battery wagon and forge and a store wagon, make up the carriages of one light battery, which is

*Only four horses appear in the picture.

†In time of peace four guns constitute a battery and four horses a "team."



Fig. 8.

divided into three platoons of two guns each. A gun with its carriage and caisson constituting a "section" in the terms of drill regulations.

Artillery has no independent roll on the battlefield, but acts in conjunction with the other arms. Its duty is to prepare and support.

As a *tactical principle it is employed in battalions of three or four batteries, and a single battery is rarely isolated except as a part of an advance or rear-guard or detached for some special service, and a single battery should never be broken up except for fighting in streets or other contracted places in which it would be impossible to find room in a single position for all its guns.

The maximum range of the 3.2-inch gun is three and a half miles, the effective range two and a half miles, and the average rate of firing seventy rounds per hour.

SIEGE ARTILLERY.

These guns are simply larger and more powerful than the light artillery above described, but of the same type, and are mounted on heavier carriages.

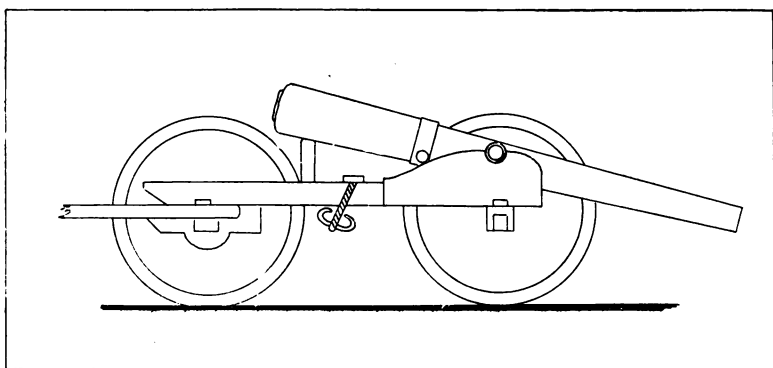


Figure 9.

*Light Artillery Drill Regulations, par. 1051.

They are attached to limbers and drawn by horses similarly to the lighter guns, except that they must move slowly and always upon roads on account of their weight. They are organized into siege trains which constitute component parts of armies in the field, to be placed in batteries behind such field works as may be thrown up.

Figure 9 illustrates the 5-inch siege gun "limbered up" for transportation.

SEA-COAST ARTILLERY.

These guns are intended only for permanent fortifications in our harbors to resist an attack from armed vessels carrying similar guns.

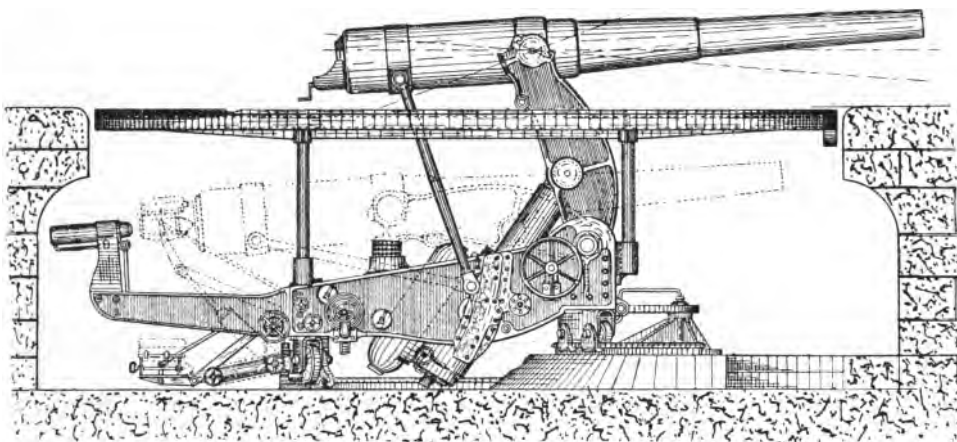


Fig. 10.

Figure 10 illustrates the 10-inch gun mounted on a "disappearing carriage." The recoil of the gun, when fired, throws it down behind the parapet, in a covered place for loading. The 8-inch and 12-inch guns are of the same type. The 12-inch gun is the largest thus far constructed for our land defenses. It weighs 52 tons, is $36\frac{1}{2}$ feet long; uses a charge of 440 lbs. of powder and an oblong projectile weighing one-half a ton. It is calculated to pierce the heavy armor of ships at ranges from 2 to 4 miles, and its extreme range is about 12 miles. The extreme ranges of the 8 and 10-inch guns are respectively 7 and 9 miles.

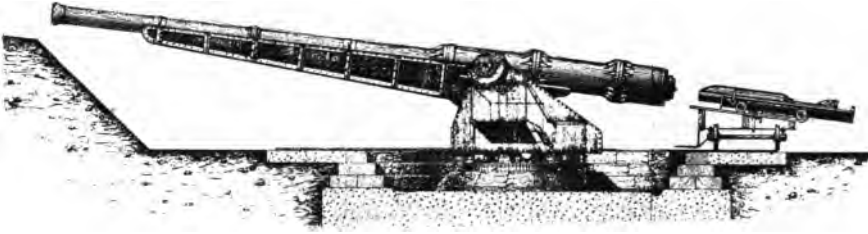


Fig. 11.

Figure 11 illustrates the pneumatic dynamite sea-coast gun intended to throw, by the force of compressed air, a projectile containing a large charge of dynamite or some high explosive over a short range—one or two miles—relying upon the destructive effect of the high explosive at the point of impact. Several of these guns are under contract for supplying the land defenses about our harbors.

MORTARS AND HOWITZERS.

A mortar is a short piece using a small charge of powder, intended for vertical fire. They are fired at as high an angle of elevation as 70° .



Fig. 12.

In figure 12, the 12-inch breech loading rifled mortar is shown. It is proposed to use these heavy mortars against vessels that are able to run the gauntlet of the long range rifle guns and by firing them at a high elevation drop heavy shells on the decks of vessels where there are only three or four inches of armor against twenty inches on the vessel's side. Sunken batteries of these mortars are under construction in our principal harbors. There are field and siege



Fig. 13.

mortars similar in construction, for dropping shells behind parapets.

There is another type of gun, the howitzer, half way between the long piece and the mortar, and intended to serve the purpose of both direct and angle fire.

Figure 13 illustrates the 7-inch siege howitzer.

SPECIAL TROOPS.

In addition to the infantry, cavalry and artillery which we speak of as the three "arms" of the service, there are troops of the engineer and signal corps and medical department attached to the various *commands; they are organized into companies and battalions, similarly to infantry.

ENGINEER TROOPS.

One battalion of engineer troops is attached to each army corps with units of organization as follows :

Company.	Battalion.
1 captain,	1 major,
3 lieutenants,	1 adjutant,
10 sergeants,	1 quartermaster,
10 corporals,	1 medical officer,
2 musicians,	1 hospital steward,
64 privates of the 1st class,	1 battalion sergeant-major,
64 privates of the 2d class.	1 quartermaster-sergeant.
	1 commissary sergeant,
	4 privates of the hospital corps,
	616—4 companies.
<hr/> Total—4 officers and 150 men.	<hr/> Total—20 officers and 608 men.

*Pages 14 and 15.

Corps Engineer Train,	{	42 6-mule ponton carriages,
		2 " trestle "
		6 " chess "
		1 " tool wagon,
		1 " forge "
		1 " store "
		4 4-mule wagons for intrenching tools,
		1 " baggage wagon.
		Total—5 4-mule and 53 6-mule carriages.

A detachment of engineer troops with the engineer train of one corps usually moves with the "advance guard" of an army so that bridges and roads may be prepared and obstacles removed ready for the main column.

Pontons are boats made by stretching canvas over frames, and when taken apart several pontons may be packed on one wagon. These pontons are anchored in a stream about twenty feet apart as supports to a bridge; the ends of stringers called "balks" are lashed to the pontons and planks called "chess" laid across these balks to form the bridge. See figure 14.

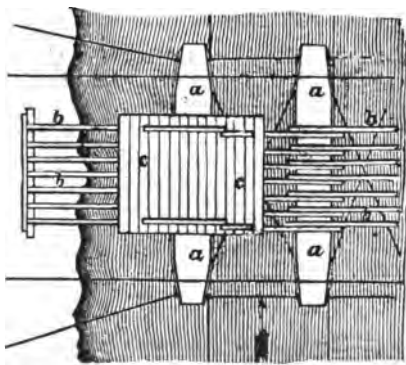


Fig. 14.

a.—Ponton.
b.—Balks.
c.—Chess.

A stream 300 yards wide may be spanned by the material carried in the "corps engineer train."

A "reserve" ponton train made up of corps trains is maintained at the headquarters of an army under the chief engineer officer, who belongs to the staff of the commanding general; temporary detachments being sent off as circumstances require.

Bridges 700 yards long were laid by troops during the War of Secession.

Engineer troops may be used to fight as infantry when necessary, but this should not be habitual. The employment of engineer troops is further discussed in the next lecture, under the heading "Engineer Corps."

SIGNAL TROOPS.

A company of signal troops is attached to each army corps, which has with it a telegraph train, consisting of one battery wagon, four wire wagons and four lance-trucks. This train is divided into four sections, each consisting of one wire wagon and one lance-truck. The battery wagon is fitted up as an office, from which four lines may be worked, and contains the necessary batteries, instruments, etc., therefor. Each wire wagon is provided with 10 or 12 miles of wire and a reel for reeling up the wire, and it is also arranged with instruments, stationery, etc., for an office. Each lance-truck carries from 300 to 500 lances, 17 feet long and about $2\frac{1}{2}$ inches in diameter, on which the line is erected, and also a supply of insulators, insulator spikes and equipments, consisting of crow-bars, climbers and marking pins. The signal company consists of 1 captain, 4 lieutenants, (1 lieutenant to each section), 1 medical officer and 175 men.

The connection between the corps of an army and between the corps headquarters and general headquarters, may be perfected in a very few hours after the halt of the army. An average speed of 3 miles an hour has been made in the erection of lines over fair ground.

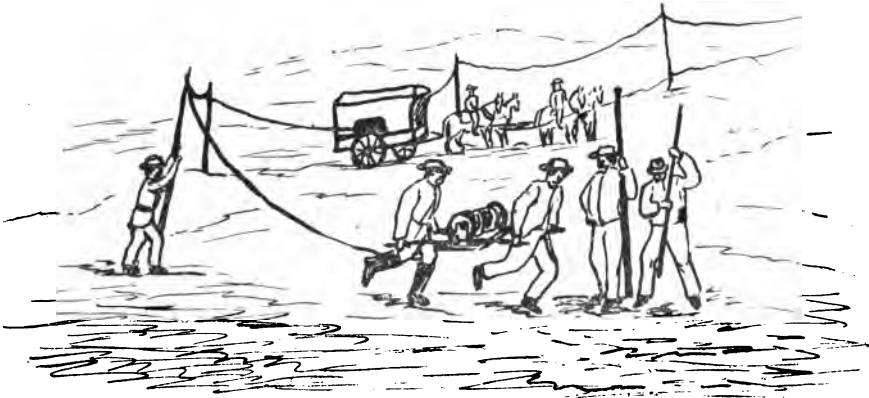


Fig. 15.

Figure 15 shows a battery wagon used as an office and a detachment putting up a line.

Portable telegraph outfits are also transported by pack mules, and there are small instruments that may be carried in a cavalryman's saddle-bags or an infantryman's haversack, so that the reconnaissance parties may tap telegraph lines and take off messages that are passing or communicate with stations.

The "section telegraph train" is the one best suited for college or national guard instruction. Small portable outfits may be secured at small expense and the drill may become very fascinating, particularly for students in electrical engineering courses. Telephones may be used as well as telegraph apparatus under certain conditions of service.

The methods of communication in the U. S. Army comprise the use of flags, torches and heliographs as well as telegraph lines and the Morse telegraph code, consisting of dots and dashes, is the one used in all the different methods.

U. S. SIGNAL AND TELEGRAPH CODE.

Alphabet.

A — —	F — — —	K — — —	P — — — —	U — — —
B — — — —	G — — — —	L — — —	Q — — — —	V — — — —
C — — —	H — — — —	M — — —	R — — —	W — — — —
D — — — —	I — — —	N — — —	S — — —	X — — — —
E — — —	J — — — —	O — — —	T — — —	Y — — — —
	Z — — — —	& — — — —		

Numerals.

1 — — — —	3 — — — —	5 — — — —	7 — — — —	9 — — — —
2 — — — —	4 — — — —	6 — — — —	8 — — — —	0 — — — —

Punctuation Marks.

Comma — — — —	Interrogation — — — —	Parenthesis Pn
Semicolon Si	Quotation Qn	Brackets Bx
Colon Ko	Paragraph — — — —	Dollar mark Sx
Period — — — —	Exclamation — — — —	Dash Dx
Hyphen Hx	Underline Ux	

NOTE.—A fraction is made by inserting a dot between the numerator and denominator—Example, $\frac{7}{8}$, — — — — —

Figure 16 shows the manner of using the above code by flags or torches.

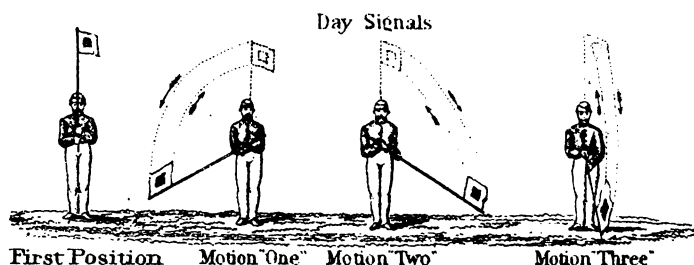


Fig. 16.

Motion one to the right, means a "dot," motion two to the left, a "dash," and motion three to the front, a "space." The torch is waved in the same way as the flag; a torch being placed at the feet of the man to refer the moving torch to, as a centre.

Under favorable conditions of atmosphere and with good telescopes, flag signals have been read twelve miles, but practically flag stations are not more than five miles apart, and torch signals are used about the same distance.

(Flags being used by day and torches at night.)

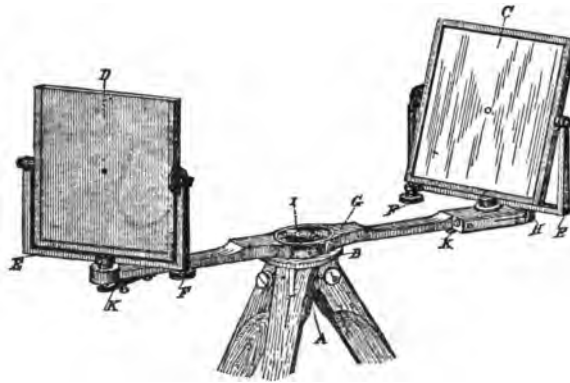
The equipments for one flag and torch station are all packed in one "kit" together to be carried by the soldier mounted or on foot.

For reading flag and torch signals the "field glass" that can be slung by a strap over the shoulder is sufficient, as these have a working range of five miles and under favorable conditions of atmosphere as much as ten miles.

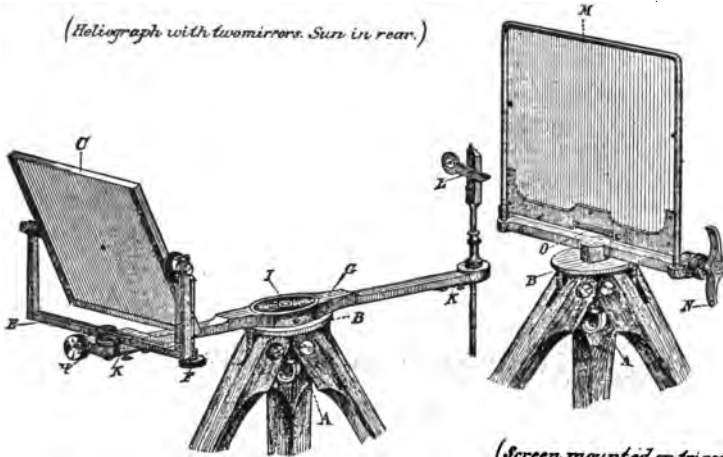
THE HELIOGRAPH.

An instrument called the heliograph, or sun telegraph, constructed with small mirrors made to turn upon both a horizontal and vertical axis, mounted upon a tripod, so arranged as to reflect the sun's rays in any direction, and to make the flashes to appear and disappear in rapid succession is in use in the Army; and by it messages may be transmitted much faster than with flags or torches, and it can be used at longer ranges. It is manipulated by a key, similar to the electric instrument.

*The flash meaning a "dash" is three times as long as one for a "dot."



(Heliograph with two mirrors. Sun in rear.)



(Screen mounted on tripod.)

(Heliograph with one mirror and sighting rod. Sun in front.)

Fig. 17.

- A Tripod.
- B Tripod head.
- C Sun mirror.
- D Station mirror.
- E Mirror supports.
- F Tangent screw for revolving mirror about horizontal axis.
- G Mirror bar.
- H Tangent screw with ball bearings for revolving mirror about vertical axis.

- I Clamp screw for attaching mirror bar to tripod.
- K Spring for clamping mirrors and sighting rod.
- L Sighting rod with movable disk.
- M Screen.
- N Key for screen.
- O Screen spring.

The range power of the heliograph may be placed at from 25 to 100 miles, in fact it is only limited by the curvature of the earth, and this may be overcome

to some extent by selecting high points for stations. This instrument can, of course, only be used when the sun is shining.

Electric lights are coming into use to some extent as signals, but they have much less range power than sunlight flashes.

Pigeons are used as message carriers and balloon service is also conducted by "Signal Troops."

"Homing Pigeons" and "Military Balloons" will be considered in the next lecture under the heading "Signal Corps."

HOSPITAL CORPS.

All hospital service is preformed by members of the hospital corps, who are enlisted for and permanently belong to the Medical Department. In time of war the corps performs the necessary ambulance service under such officers of the medical department as may be detailed for that duty. There should be attached to every military command one medical officer, one hospital steward, and at least three privates of the hospital corps, and the general rule is to allow at the rate of one medical officer, one hospital steward and from two to four privates to each battalion or squadron of the "line" when battalions or squadrons serve together in regiments; cavalry and artillery requiring more than infantry.

For each post of two companies or a regiment, one acting hospital steward is also allowed.

These rules give a surgeon, two assistant surgeons, three hospital stewards, one acting hospital steward, and six privates of the hospital corps to each infantry regiment, and one extra medical officer and one private of the hospital corps are allowed to each brigade and division headquarters. On the march and in battle each medical officer is habitually attended by a mounted private of the hospital corps. Hospital stewards, acting hospital stewards and at least one private of the corps, are mounted when serving in the field and all privates of the corps are mounted when serving with mounted commands.

Four privates of each company, troop or battery of the line are selected by their company commanders, with concurrence of the surgeon, as litter bearers.

They are officially designated "company bearers" and wear the "brassard" around the left arm.

Company bearers and men of the hospital corps are instructed under the supervision of the surgeon of the post, at such times as the commanding officer appoints, in the duties of litter bearers and rendering first aid to the sick and wounded. During an engagement the company bearers acting under orders of their company commanders and supervision of their regimental surgeons render aid to their wounded comrades and carry them to the rear. Upon being relieved by members of the Hospital corps they immediately join their companies.

With each regiment there is a temporary hospital used as the first dressing station and for the reception and care of those likely to be but temporarily disabled. The most serious cases are sent by the regimental surgeon back to the field hospitals, which is usually located near division headquarters, in some house if practicable, where most of the surgical operations and amputations are performed.

The general hospitals are under the exclusive control of the Surgeon-General, as directed by the Secretary of War. They are permanently located well to the rear of active operations in some city or town and connected with the "front" by railways and waterways.

The Medical Department conducts the transportation of the sick and wounded in the field, even to the extent of having railway trains, boats and transports exclusively under its control.

The "red cross" ambulance is the conventional vehicle for field service.

This has been named from the "red cross" on a white ground that is upon each side of the ambulance,—under provisions of the "Geneva Convention" adopting this as the distinctive insignia for hospitals and ambulances the world over.—White flags containing the "red cross" are also used to mark general hospitals and the way to them.

The surgeon and ambulance habitually move at the rear of the command to which they belong.

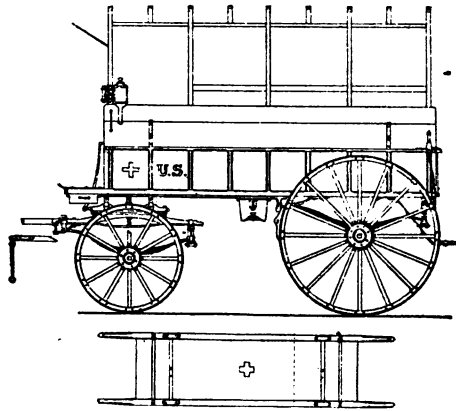


Fig. 17.

Figure 17 shows an ambulance with one of its "litters."

One ambulance goes with each command numbering less than 200 men; two when the number is greater than 200 but less than 500, and three with a full regiment of three battalions.

In time of war two ambulances go with each corps headquarters, and two army wagons are also allowed to each division train of ambulances.

Travels and mule litters are also used for mountain service.

Privates of the hospital corps are organized into companies with the hospital stewards and acting hospital stewards under the command of the officers of the Medical Department, and these companies in war times habitually camp near the division hospital, from which the "medical director" manages the hospital service, as the exigencies of battle require.

Members of the hospital corps are not required to perform military duties other than those pertaining to their corps; though they are instructed in such drill, both foot and mounted, as is necessary for their service.

WAGON TRAINS.

An army *corps having an aggregate strength of 43,191 officers and men

*Page 15.

and 120 guns, requires 1,306 carriages other than gun carriages, and a total of 11,770 animals; and these proportions embody the general rule in army organizations—"about one animal to each four soldiers."

As has been seen in the foregoing tables, field transportation is made up principally of 6-mule wagons. Each of these carry, over all kinds of roads, about *2500 pounds beside the forage for the team for five days.



Fig. 18.

Figure 18 illustrates the conventional "6-mule team" hitched to an army wagon ready to "pull out" into its place in the train. In the United States mules are used in preference to horses for field transportation.

The team of six mules is managed by one driver, who rides the near wheel mule and controls the team by one line called a "jerk line" running to the near ring of the bit of the near lead mule, called the "line mule," the off lead mule being connected with the line mule by a "*jockey stick*" running from the bit of the off mule to the hames of the line mule. The line mule is very carefully trained so that by pulling steadily on the line the team wheels to the left, while by jerking the line the team wheels to the right. The army wagon is rigged with six bows over which a canvas cover is drawn tightly so that supplies need never get wet. The army wagon is staunch, short-coupled and rigged with a brake, which is worked by the driver from his seat on the wheel mule, by means of a strap running to a lever near the hind wheel. Spare poles, reaches and other parts are carried on each wagon, and each 6-mule team with its wagon and

*4000 pounds over good roads.

driver is complete in itself, so that one may be sent off alone or any number put together to make up a train.

Each train of 25 wagons is in charge of a wagon master, who has under him two assistant wagon masters.

The wagons of the same train form in one or two columns according to the nature of the country over which they move.

In large commands separate trains of wagons must be provided for ammunition for infantry, cavalry, and artillery, for forage, for rations and for baggage. These wagon trains are divided into two general classes—the advance or “division trains” and reserve or “corps trains.” The former carry such supplies of ammunition, forage, rations and baggage as may be needed at once, and must accompany the troops, while the corps or reserve trains moves in rear of the army as feeders to the advance trains.

Commanders generally indicate the route which the wagons will take. As a rule, they are directed not to interfere with the movements of the troops, and when they come in contact with troops or ambulances, they are habitually required to yield. It is, however, sometimes directed that troops shall take the sides of the road—as was the case for Sherman’s army on the great “*march to the sea*”—for the reason that they can better march off the roads than the wagons can, and are on hand to assist the wagons in case of need. Proper escorts are regularly detailed to guard the trains, their size depending upon the likelihood of their being attacked by the enemy.

Pack trains are organized for service where there are no roads, and over mountain trails where it is impracticable for wagons to go.

Sufficient transportation must be furnished so that the infantry and cavalry can at all times have 200 rounds of cartridges per man. (100 rounds in belts, 36 rounds in the regimental ammunition wagons and 64 rounds in the reserve column.)

Each field battery requires 273 rounds per gun. (42 in each limber, 189 per gun in the caissons with the battery, and 42 rounds per gun in the ammunition column.)

In addition to ammunition supplies the corps train should carry five days' supply of rations and forage; however, if forage can be secured in the theatre of operations only one day's forage need be carried by the train.

Baggage wagons for the several headquarters are allowed as follows: One 6-mule wagon for regimental headquarters; two 6-mule wagons for brigade headquarters; three 6-mule wagons for division headquarters, and six 6-mule wagons for corps headquarters.

Roughly estimated, 1,000 rounds of rifle cartridges weigh *100 lbs.; light artillery ammunition 18 lbs. per round; and one ration, 4 lbs. gross. The full forage ration is 14 lbs. of hay per animal, 12 lbs. of grain per horse and 9 lbs. of grain per mule. Hay, however, is rarely carried with a train; the animals are usually grazed or hay procured *en route*.

HORSE DEPOT.

Each corps requires a depot containing at least 100 horses and 100 mules from which losses may be quickly supplied.

QUARTERMASTER'S EMPLOYEES.

In European armies there are enlisted troops for service as teamsters, and with wagon trains, railroads, etc.; but in the United States this service is usually performed by "civilian employees," or by detailing men from the "line" on extra duty in the quartermaster department. The latter practice is not a good one, as it depletes the effective strength of the line or fighting force, and the quartermaster department needs an organized force within itself for the sake of better discipline.

VETERINARY SURGEONS.

One veterinary surgeon, with the pay of \$75 per month, is allowed to each of the cavalry regiments, and to each of the seventh, eighth, ninth and tenth regiments of the regular army an additional veterinary surgeon at \$100 per month is allowed. These veterinary surgeons are not included in the organization table

*New model for magazine guns, 76 lbs.

of the army. They are appointed by the Secretary of War; have the relative rank of sergeant-major and are entitled to the same allowances of quarters, fuel and lights. They have no uniform prescribed by regulations and in many respects are viewed as civilian employees similarly to "contract surgeons" employed in the medical department of the army.

CLERKS AND MESSENGERS.

The clerks and messengers are employed and apportioned to the several military *headquarters by the Secretary of War; they are viewed as civilian employees. Clerks of the first class receive \$1,000 per annum; of the second class \$1,100 per annum; of the third class, \$1,200 per annum; and messengers \$60 per month.

INDIAN SCOUTS.

Indian Scouts to the number of 40 are authorized to be enlisted, within the strength of the regular army (25,000 men). They are enlisted for six months and receive the same pay and allowances as cavalry soldiers while so serving, and in addition forty cents per day for their horses.

Our force of scouts is now used principally for guides and trailers, and distributed around to posts in the Indian country in small detachments. The practice of employing friendly Indians as allies for white troops has come down to us from the earliest Colonial days, and the success of our most famous Indian fighters has been due largely to their skill in using friendly Indians as allies with a sufficient force of cavalry to control and support them. We have, from time to time, had larger forces of these scouts organized into companies under officers detailed from the army, and the same practice would again be pursued in a general Indian campaign.

Routine Duty within a Regiment.

THE COMPANY, TROOP AND BATTERY.

The company in infantry, the troop in cavalry and the battery in artillery constitute the smallest tactical units in their respective arm of the service, and the

*Pages 14 and 15.

captain of each is both its governing and administrative head. He procures for his men clothing and camp and garrison equipage from the quartermaster of the regiment or post to which his company, troop or battery belongs, rations from the commissary, and arms, ammunition, and equipments from the ordnance department, and for all of these he becomes personally responsible to the government. The German soldiers call their captain the "Company Father" and he watches over his company much as a father does over his family.

Lieutenants are the captain's assistants, and in case of his absence or sickness the senior in rank takes the captain's place. They should have access to the records and returns of the company, and be familiar with them that they may know what to do when the captain is suddenly called away. The company should be permanently divided into platoons, each under the supervision of a lieutenant.

The first sergeant is appointed from the sergeants of the company, troop or battery by the captain; and in an illustrative sense, he is the company foreman. All orders to the company affecting administration or discipline are executed through him, whether given by the captain or one of the lieutenants. He is the immediate custodian of the property for which the captain is responsible to the government, and assisted by one of the men detailed as "company clerk" keeps the rosters and records of the company. He lives with the company, but in a room or tent apart from the rest of the men, and is usually given power to arrest men of the company for disturbance, reporting immediately thereafter to one of the company officers for confirmation of the act, as only commissioned officers can exercise the constructive power of arrest; the other sergeants are assistants to the first sergeant, each having charge of one of the sections into which the men of the company are usually divided. Each corporal usually has charge of a squad, which is a subdivision of the section.

The "Drill Regulations" govern all tactical formations and movements, and the captain is held responsible that all within his company know and perform their duties as prescribed therein. He should not attempt to perform the details of service, but prepare and supervise such a system of discipline that each

person under his command can be held accountable for his part, and no company discipline can be considered complete or efficient unless it be such that any two privates coming together for duty clearly understand which one has authority over the other.

During six months of the year, from October to March, non-commissioned officers' school should be held semi-weekly, conducted by one of the lieutenants, as directed by the captain; and theoretical instruction should in turn be imparted to the privates by the chiefs of sections or squads under supervision of lieutenants, each of which would supervise instruction in his own platoon.

The companies, troops and batteries in each regiment are designated by the letters of the alphabet beginning with A and omitting J, *e. g.*, "Company A 3d Infantry," "Troop B 4th Cavalry," "Battery M 5th Artillery."

Articles of public property issued to a company should be marked with the letter of the company and number and arm of the regiment. Haversacks and blanket bags will be uniformly marked on the outside as follows: Cavalry, crossed sabers; artillery, crossed cannons; infantry, crossed rifles; with letter of company above and number of regiment below the intersection; the special corps of the Army according to their respective devices. The canteen will be marked with the letter of the company, number of the regiment, and number of the man.

The returns and muster rolls are made out in the name of the captain whether he be present or absent.

Each morning after breakfast, the barracks or tents and grounds around them are thoroughly cleaned by police details. Usually the old guard constitutes the police detail for the day after it marches off guard. At "sick call" which is sounded at an hour in the morning fixed by the post or camp commander, the *first sergeant marches the sick of the company to the hospital for treatment, taking with him the sick book, each page of which is prepared for one day, in form as follows:

*The First Sergeant may send another non-commissioned officer as "sick marcher."

Sick Report of Company "A" 4th Regiment of U. S. Infantry, May 20, 1895.

ENTRIES TO BE MADE BY THE FIRST SERGEANT.

Name of Patient.	Rank.	Date when taken sick.	No. of times reported sick by the Surgeon during the year.		No. of days on sick report during the year.
Henry Brown	Pvt.	May 1, '95	19	19	
Wm. Smith	Corp.	" 15, "	5	10	
Eben Johnson	Pvt.	" 20, "			
Samuel White	"	" 20, "			
Rufus Rangle	"	" 20, "			

* I certify that I have carefully examined the above report.

JOHN JONES,
Captain Company "A."

SURGEON'S REMARKS.

Disease. (If feigned so state.)	Whether sick in Quarters or in Hospital.	Of what Duty Capable when sick in quarters.	When Returned to Duty.
Catarrh.....	Hospital,		
Piles.....	Duty,		May 20, '95
Tonsillitis.....		Qrs.	
Pneumonia.....	Hospital,		
Sore throat	Duty,		May 20, '95

J. S. WALKER.
Asst. Surg. U. S. A.
Attending Surgeon.

*The examination may be made and the list signed by any commissioned Officer of the Company.

After returning from sick call, the first sergeant makes up the company morning report, signs it, takes it to the captain for his signature, and then to the adjutant's office before eight o'clock a. m. or such hour as may be designated in post orders.

This report is made out in a book having a page for each day, and on a form furnished by the adjutant-general of the army, alike for all companies, so that a consolidated report can be made up at the adjutant's office.

All passes for the day for enlisted men go in with the morning report book in the following form :

CHARLES MAYER, <i>1st Sergeant Co. A, 4th Inf.</i>	FORT RILEY, KAN., May 20, 1895.
	Private WM. F. PRESCOTT, Co. A, 4th Inf., has permission to be absent from the garrison from 4 o'clock P. M., 20th inst., until 9 o'clock A. M., 21st inst.
	Approved JOHN JONES,
	By order of Col. ANDERSON; <i>Capt. 4th Inf., Com'g Co. "A"</i>
	CHAS. F. STOWE, <i>1st Lt. & Adj't 4th Inf. Post Adjutant.</i>

No soldier can absent himself from the camp or garrison beyond the sound of the trumpet calls or chain of sentinels without a pass signed in the above form. Officers must also secure verbal permission from the "commanding officer" to so absent themselves; the lieutenants first securing their captain's permission.

At 12 o'clock M, or such hour as may be fixed by the commanding officer of the post or camp, "first sergeant's call" is sounded, at which each first sergeant repairs to headquarters and gets back his morning report book with the orders for the day, which he immediately takes to his captain who issues the necessary instructions for their execution.

The sergeants and corporals of the company, troop or battery are appointed by the colonel (or commanding officer) of the regiment upon recommendation of the captain, (or company commander). Each sergeant and corporal receives a warrant signed by the colonel and they can only be reduced by expiration of term of service; by the colonel or by the sentence of a court martial.

They should be supported by all superior officers in their authority except when it is improperly and unjustly exercised, and as a rule they should not be reproved in the presence of their juniors in rank.

The positions next below corporal are, in a troop of cavalry, trumpeters, farriers and blacksmiths and saddler; in a battery of artillery or company of infantry musicians (either trumpeters or drummers and fifers) and artificers. These are enlisted for the positions, or may be appointed by the captains. Company, troop or battery commanders may also appoint one wagoner who drives the team assigned to a company for police and other service. All other soldiers in a company are officially designated "privates." Captains appoint "lance-

corporals" when the number of corporals present for duty does not meet the requirements of the service, but they are simply acting corporals without increased pay.

The record books of the company, troop or battery are as follows: Letters sent and letters received with index books for each, sick-book, record of vaccination, Co. clothing-book, morning-report-book, descriptive-books for officers, men and animals, company fund book, target record book, record of property issued, book of rosters and an order book.

Besides these books such returns must be made as are required by regulations and orders.

Blank forms for all these records and returns are furnished by the bureaus to which they pertain, and detailed instructions concerning them are printed thereon.

Strict attention should be paid to police and sanitary regulations by commanders of companies, troops, batteries, bands and detachments. They should make daily inspections of men's barracks or tents and kitchens, and hold chiefs of squads responsible for the cleanliness of their men; that they bathe frequently, keep their hair short, beard neatly trimmed, and arms, accoutrement and clothing in good condition.

Once each week inspection should be held, under arms, from which no one is excused, except the guard and the sick in hospitals, and for this inspection bunks and bedding should be overhauled, floors, tables and benches scoured, and articles of black leather polished as well as arms and accoutrements cleaned.

Particular attention must be paid to cooking and messing. The *company kitchen should be placed under the immediate charge of a non-commissioned officer, and a suitable number of men fully instructed in the art of cooking, and every soldier sufficiently so instructed that he can cook his own rations when detached.

By due economy in company messing some parts of the rations can be saved and sold, and a fund created with which to provide additional articles of diet. A

*Company is here used in a general sense, including troops, batteries and bands.

company fund account must be kept with vouchers for each expenditure, and, quarterly, a "company council" convened consisting of all company officers present, to audit the accounts, and their proceedings should be recorded in an appropriate book.

In the proceedings of company councils the regimental or post commander decides disagreements.

The subject of rations and field cooking will be considered in detail in the succeeding lecture under the head "Subsistence Department."

When a company, troop or battery serves alone, the captain becomes the "commanding officer" in the technical sense of regulations with enlarged powers, and organizes a staff by appointing one of his lieutenants, adjutant, and the other acting assistant quartermaster, and acting commissary of subsistence. He will also be furnished with a medical officer as post or camp surgeon, and one hospital steward, and three privates of the hospital corps would be assigned to his command. He would detail one of the sergeants of his company to act as sergeant-major, and unless there be supplied from the respective staff departments a commissary sergeant and post quartermaster sergeant, he also details sergeants or corporals from his company to act in these capacities, and his command would in all respects be organized for administrative purposes the same as the larger commands composed of several companies, troops or batteries.

THE BATTALION OR SQUADRON.

As has previously been indicated, in infantry and artillery the command next larger than a company or battery is the battalion, and in cavalry the squadron. The battalion or squadron is commanded by a major or by the senior captain present, who appoints one of the lieutenants belonging to his command as battalion adjutant, and one of the sergeants as battalion-sergeant-major. When several battalions or squadrons serve together, as parts of larger commands, they are tactical rather than administrative organizations, and the battalion or squadron commander may or may not appoint other staff and non-commissioned staff officers as circumstances require. When the battalion or squadron serves as a separate

command, a battalion quartermaster and commissary, and other administrative positions, would be filled as indicated in the previous articles for a company serving separately, only on a scale commensurate with the increased size of the command and demands of the service. The necessary men would be detailed from the companies, proportionately, for clerks and assistants in the adjutant's office, and in the quartermaster's and commissary departments. In fact, the separate battalion or squadron commander would have a staff organized practically as for a regiment.

REGIMENT.

The regiment is both a tactical and administrative organization, and when all of the companies of a regiment serve together they will be comprised in three battalions or squadrons, and each regiment would have a band made up as hereafter specified under the head of "band and field music."

While the new "Drill Regulations" prescribe the same three battalion organization for infantry as for cavalry and artillery as indicated above, congressional legislation is behind in actually providing for this organization, so that at the present time a United States infantry regiment contains but one major and ten companies. However, as the *Tactics* call for this formation, legislation will undoubtedly soon meet the tactical requirements.

The field and staff officers are all mounted except chaplains. They must each own two horses, but the government supplies them forage. This rule is general for all mounted officers.

In time of peace two of the batteries in each regiment of artillery are armed and equipped as light batteries; the remainder of the regiment perform duty as infantry, and in addition manœuvre the heavy artillery in the sea-coast fortifications.

Officers' schools or lyceums are conducted by the colonel or one of the field officers, at least twice a week, from October 1 to March 31 of each year, for which the colonel prescribes the course and methods of instruction.

FIELD OFFICERS.

The *colonel* commands the regiment and is assisted by the lieutenant-colonel who occupies a position in the regiment analogous to that of a lieutenant in a company.

The majors in addition to their duties as immediate commanders of their battalions or squadrons, are also assistants to the colonel.

The colonel, lieutenant-colonel and majors are styled "*field officers*" and in their order of rank the lieutenant-colonel and majors become *regimental commander* in the absence of those senior to themselves.

REGIMENTAL STAFF.

The colonel (or regimental commander) appoints from the lieutenants of the regiment an adjutant and quartermaster (the latter subject to the approval of the Secretary of War). These are extra lieutenants and do not belong to companies.

In time of war each regimental organization would include a surgeon, two assistant surgeons, a commissary and chaplain.

DUTIES OF REGIMENTAL ADJUTANT.

The adjutant, under direction of the regimental commander, has charge of the various rosters of the service; he makes, publishes and verifies all details; keeps the records of the regiment and performs such military duties with troops as are required by tactics and regulations. The adjutant should be courteous to, and on friendly terms with the officers of the command he represents, and should avoid all discussions of the orders or military conduct of his superiors. He should inform himself upon all points of military usage and etiquette. He should endeavor, at all times, to exert the influence belonging to his station, in sustaining the reputation, discipline and harmony of the regiment.

All official communications coming from officers within the regiment and requiring the action of the regimental commander are addressed to the Adjutant and he signs all orders and communications going to those officers by order of

the colonel or regimental commander. He is also in direct command of the band as a captain is of each company.

DUTIES OF REGIMENTAL QUARTERMASTER.

The duties of quartermaster require business qualifications. He receives his orders usually direct from his colonel, though written orders affecting his duties should be signed by the adjutant, and he should address official communications intended for the action of the commanding officer to the adjutant. He has no power to issue orders, except when acting as adjutant, or to his own employees. In the absence of the adjutant he performs his duties and *vice versa*, the adjutant takes his duties in his absence. He has charge of all Q. M. property belonging to the regiment and in addition is usually Post Quartermaster when the regimental commander may be in command.

He supplies clothing, camp and garrison equipage, forage, transportation, quarters, etc., upon requisition from the captains approved by his "Commanding Officer" and in turn keeps his storehouse supplied by timely requisitions upon the chief quartermaster of the department or next higher command, and he manages the "trains" and means of transportation pertaining to the regiment or command for which he is quartermaster.

COMMISSARY.

When the regiment is serving separately or at a post commanded by the regimental commander, he appoints some lieutenant of the regiment "Acting Commissary of Subsistence" if no officer of the subsistence department be assigned, and supplies rations for the men and groceries for sale to officers and men, in a similar manner to which quartermaster's stores are supplied by the quartermaster.

SURGEON AND ASSISTANT SURGEONS.

At regimental headquarters there is usually detailed at least one surgeon (major) and one or more assistant surgeons (captains or lieutenants) whose duties are to manage the hospital and treat the sick and wounded, supply medi-

cines by timely requisitions upon medical depots, conduct the ambulance service, and advise the commander concerning hygienic measures.

CHAPLAIN.

The four colored regiments of the regular army have regimental chaplains, but in time of peace the other regimental headquarters are usually supplied by details from the *Post Chaplains.

NON-COMMISSIONED STAFF.

The regimental staff officers are assisted in their duties by the non-commissioned staff, as captains are by the first sergeants; the adjutant by the *sergeant-major*; the quartermaster by the *quartermaster-sergeant*; the commissary by the *commissary-sergeant*; and the surgeons by three hospital stewards. The non-commissioned staff officers are in turn assisted by men detailed from the companies on extra or daily duty, and by fatigue details as ordered from the adjutant's office, day by day. The hospital attendants are regularly enlisted men of the hospital corps. One or more hospital matrons are allowed to each post-hospital for doing the laundry work.

BAND.

A good military band is an essential part of each regimental organization.

One chief musician is authorized by law for each regiment of cavalry, artillery and infantry, and the commanding officer of each regiment is authorized to detail from the companies of his regiment, one sergeant and sixteen privates, in addition to the chief musician, to constitute a regimental band.

The musicians of the band are for the time being dropped from company muster-rolls and mustered in a separate squad under the chief musician, though they are instructed as soldiers and liable to serve in the ranks of companies if occasion requires.

*See organization table page 6.

The chief musician is the "leader" and musical director of the band.

Bands wear the general uniform of their regiments, though regimental commanders are authorized to add such ornaments as they deem proper.

Bands of cavalry regiments are mounted, and provided with instruments adapted to use on horseback.

FIELD MUSIC.

One chief trumpeter is authorized by law in each regiment of cavalry, and one principal musician in each regiment of artillery and infantry. These belong to the non-commissioned staff of the regiment, and each company troop or battery has two enlisted musicians, usually trumpeters. These non-commissioned staff officers and company musicians constitute what is termed the "field music" of the regiment. The company musicians serve with their respective companies, but when their companies are serving at regimental headquarters, they march in rear of the band upon all occasions of ceremony, and, under the leadership and direction of the chief trumpeter (in cavalry) or a principal musician (in infantry and artillery) supply the place of the band, when the band does not appear.

Musicians of light artillery battery are furnished with a small brass Bb bugle and all other troops with G trumpets with F slide, and if desirable a detachable F crook.

Foot troops may if desirable use the drum and fife in place of the trumpet.

When the field music is by itself and using the drum and fife, the fifers are placed in front of the drummers. In the company the fifer is on the right of the drummer.

DRUM MAJOR.

The grade of drum-major does not appear in the organization table of the U. S. Army, and consequently no uniform is prescribed in army regulations for a drum-major.

Either the chief trumpeter, one of the principal musicians, a sergeant of the band or such non-commissioned officer as the regimental commander designates,

customarily fills the position of drum-major, prescribed in Drill Regulations, and the non-commissioned officer acting in this position, consequently wears the uniform of his proper grade. Regimental commanders are authorized to add such ornaments to the band uniform as they deem proper, and the drum-major's uniform is usually made to contrast somewhat with that of the band.

The bear-skin hat is the conventional head dress. He is armed with the non-commissioned staff officer's sword, and on parade and occasions of ceremony carries a staff called a "Baton," with which he gives the conventional signals, to the band, prescribed in Drill Regulations.

The person selected for drum-major should be of good military figure, of commanding presence and experienced in military drill. Though he need not necessarily be a musician he should have a "correct ear" as he beats time for the band with his staff.

From the time the band leaves the band-room until its return and dismissal he has full charge of its movements. The leader selects the pieces to be played, but waits the proper signal from the drum-major to play and to cease playing.

Conversation in ranks is to be avoided, and musicians should keep their position with soldier-like attention, as though they were in the ranks of a company.

When required to play at a funeral, the band should march to a point near the remains without music.* While the body is being removed to the hearse something appropriate should be played; Pleyel's Hymn, or music of this order. While marching at the head of the column in the procession, funeral marches should be played until arriving at the cemetery entrance, when the band should open order and cease playing until the procession passes through. After the services at the cemetery have concluded the band should resume their position at the head of the column, returning from the cemetery, and immediately play some quick march. It is well to make selection of marches that are not very common, otherwise they might seem incongruous.

* Farrow's Military Cyclopædia.

FLAGS, COLORS, STANDARDS AND GUIDONS.

FLAGS.

Every military post, arsenal or permanent camp must fly a "national flag" made of bunting, having 13 horizontal stripes, 7 red and 6 white, red and white stripes alternating. The "union" of the flag occupies the upper quarter next the staff, and extends to the lower edge of the fourth red stripe from the top. The number of the stars is the same as the number of States of the Union; a star being added for each new state on the 4th day of July next succeeding its admission.

There are three sizes of these flags, the "garrison flag" 36 ft. fly by 20 ft. hoist, to be hoisted only on holidays and important occasions; the "post flag" 20 ft. fly by 10 ft. hoist, for habitual use in pleasant weather; and the "storm flag" 8 ft. fly by 4 ft. 2 in. hoist, to be used in stormy or windy weather.

COLORS AND STANDARDS.

Each regiment of infantry or artillery and the engineer battalion carry two silken flags called "colors," 5 ft. 6 in. fly by 4 ft. 4 in. on the pike; one of these flags to be the "national color" and the other a "regimental (or battalion) color;" blue for infantry and scarlet for artillery and engineers.

Each cavalry regiment carries a silken standard "national color" 4 ft. fly and 3 ft. on the lance, and also a regimental standard of yellow silk of the same size.

The silken national color or standard is carried in battle, campaign and on all occasions of ceremony at regimental headquarters in which two or more companies of the regiment participate. The regimental color or standard is carried in like cases in battle, campaign and at reviews and inspections. At ceremonies other than reviews, inspections and escort of the color, it will be carried only when so ordered by the regiment commander. A similar rule applies to the use of the color of the battalion of engineers.

The national or regimental color or standard, uncased, passing a guard or other armed body will be saluted, the field music sounding "to the color" or "to the standard." Officers or enlisted men passing the uncased color will render the prescribed salute; with no arms in hand, the salute will be made by uncovering.

The colonel selects the most soldierly, reliable, "duty sergeant" of the regiment as the "national color bearer" and another possessing similar qualities to carry the "regimental color." Two experienced soldiers are also selected by the colonel to complete the color guard.

The sergeant carrying the national color is in command of the "color guard" and requires respect to be paid the colors on all occasions, when under guard.

The color, kept at the office or quarters of the colonel, is escorted by the color guard, marching in one rank, the color bearer in the center, to the color company on its parade ground; and in like manner back to its place of deposit.

The color guard, at the command of the color bearer, presents arms on receiving and on parting with the color; in the latter case, the color guard returns to the carry at the command of the senior member of the guard.

GUIDONS.

Each troop of cavalry and light battery of artillery has a silken guidon cut swallow-tail, 15 in. to fork 3 ft. 5 in. from lance to swallow-tail, and 2 ft. 3 in. on the lance.

CAMP COLORS.

Six bunting "national flags," 18x20 in. on poles of ash 8 ft. long and 1 1-8 in. in diameter, and the butt end armed with a pointed ferule, should be kept at regimental headquarters for use at ceremonies to mark alignments and points for changing direction.

LECTURE NO. 3.

The Staff Departments.

In the †organization of the United States Army, immediately following “general officers,” there appear the several sub-divisions comprising “the staff,” viz : military secretary, aides-de-camp to general officers, adjutant general’s department, inspector general’s department, judge advocate general’s department, quartermaster’s department, subsistence department, medical department, pay department, corps of engineers, ordnance department, signal corps and post chaplains.

The functions of these staff officers and departments have heretofore been but briefly defined, and it is the purpose of this lecture to outline the organization and sphere of duty within these several departments, at the Military Academy at West Point, and at schools and colleges having military departments managed by officers of the Army.

MILITARY SECRETARY.

When the grade of lieutenant general is filled, such officer may select from the army one officer to serve as his “military secretary” who ranks as lieutenant colonel of cavalry, while so serving. This, however, is but a temporary appointment and when the officer is relieved from the duty, he reverts to his grade in his arm or department of the service.

AIDES-DE-CAMP TO GENERAL OFFICERS.

When the position of general is filled, such officer may select from the army six officers to serve as aides-de-camp who shall have the rank of colonel of cavalry while so serving. A lieutenant-general may, in addition to his mili-

† Lecture No. 1, page 6.

tary secretary, select two officers of the army to act as aides-de-camp, who hold the rank of lieutenant-colonel of cavalry while so serving. Each major-general may select three aides from the captains or lieutenants of the army and each *brigadier-general may select two aides from the lieutenants of the army. These aides-de-camp, like the military secretary, are only temporarily detailed and do not increase the strength of the army. Their duties are of a confidential nature and cannot be well defined. In time of war they become very important officers, and should possess professional skill and training of the highest order. They are not only charged with transmitting orders of the chief, but are often called upon to issue orders in his name, without opportunity for previous consultation with him, and must consequently have a full and accurate knowledge of the intentions of the chief, and an understanding of the plan of campaign in detail.

ADJUTANT GENERAL'S DEPARTMENT.

This is the department of *correspondence, orders, and records*, and embraces the *bureau of military information*.

All general orders which emanate from the War Department or the Headquarters of the Army; the orders of detail, of instruction, or movement, and all general regulations for the Army, are communicated to the troops through the office of the Adjutant General.

The record of all military appointments, promotions, resignations, deaths and other casualties; the registry of all commissioned officers; the filling up and distribution of their commissions, and the preparation and issue of the army register, pertain to the adjutant general's office.

The adjutant general's office is the repository for the records of the War Department which relate to the *personnel* of the military establishment, and to the military history of every commissioned officer and soldier of the regular and volunteer forces in the service of the United States.

*The heads of staff departments ranking as brigadier generals are not entitled to aides.

In this office the recruiting service is conducted ; the names of all enlisted soldiers are enrolled, their enlistments and descriptive lists are entered, and all deaths, discharges, desertions, etc., are recorded.

In this office the general returns of the army are consolidated ; the monthly returns of the regiments and posts and the muster rolls of companies are preserved ; the inventories of the effects of deceased officers and soldiers are entered ; and the annual returns of the militia, required by law to be submitted to congress are prepared.

Besides the Adjutant General of the Army who ranks as brigadier general and is the chief of the bureau in Washington, there are four colonels, six lieutenant colonels and five majors styled "assistant adjutant generals." In time of peace these "assistants" are detailed on duty at the headquarters of the various military departments, and in time of war every brigade, division corps or separate army has its assistant adjutant general and when there are not enough officers properly belonging to the adjutant general's department to supply all these organizations, "line" officers are detailed for this duty, styled "acting assistant adjutant generals," and their position and duties within the brigades, divisions, corps, and separate armies with which they are serving, correspond to those of the adjutant general of the army. All correspondence within a command whether between staff departments or between line and staff, passes through the adjutant general or acting adjutant general. He must consequently keep fully informed of the condition and details of every other department within the command, and is the chief of staff of the commanding general under whom he is serving.

CORRESPONDENCE.

Official letters should, in general, refer to one subject only. Communications of not more than a single page in length should be transmitted on a half sheet of *letter paper, and occupy the center of the page. When more than three pages of the sheet are required for the body of the communication, an additional half sheet or more, if necessary, will be neatly pasted to it, so that the last or outer page may be left entirely blank.

Official communications will be signed or authenticated with the pen. Signatures will be plainly and legibly written with the rank and regiment or corps of the writer annexed ; if “by order,” stating by whose order.

Letter paper will be folded in three, and legal cap in four, equal folds, parallel with the writing. The inner or left hand edge of the sheet is the top when folded. The left hand fold of the outer page is the first fold. The first fold will be used, exclusively, for a brief analysis of the contents of the communication, office marks, and noting of inclosures.

A letter should be “briefed” at the first office at which received, and previous to putting upon it the first endorsement.

Endorsements commence at the top of the second fold and are serially numbered, following each other in order of date on the successive folds, leaving room after each for office marks. Additional space for endorsements will be provided by pasting slips of paper on the under side of the last fold, each slip to correspond in length and width, when attached, with the length and width of the original fold, and to turn back upon the last fold like the leaf of a book. By this arrangement the first fold, on which the office marks and brief are made, is always outside.

(Model form for letters in general.)

CAMP SHERIDAN, VT., April 4, 1895.

To the

ASST. ADJUTANT GENERAL,
DEPARTMENT OF THE ATLANTIC.
(Through military channels.)

SIR :

I have the honor to apply for one month's leave of absence, to take effect April 7th, 1895. My last leave of absence expired January 1st, 1894.

Very respectfully,

Your obedient servant,

JOHN H. BROWN,

Second Lieut. 26th Infantry.

*Official letter paper is 10 inches high by 8 inches wide.

(Form for briefing and endorsements on above letter.)

(1st Fold.)	(2d Fold.)	(3rd Fold.)
	<p align="center">FIRST ENDORSEMENT.</p> <hr/> <p align="center">CO. "A," 26th INFANTRY. CAMP SHERIDAN, VT. April 4, 1895.</p> <p>Respectfully forwarded to the Regimental Adjutant, 26th Inf'y, approved.</p> <p align="center">H. A. SMITH, Captain 26th Infantry, Commanding Co. "A."</p>	<p align="center">FOURTH ENDORSEMENT.</p> <hr/> <p align="center">HEADQ'RS. 26TH INFANTRY, CAMP SHERIDAN, VT. April 6th, 1895.</p> <p>Respectfully returned through Comd'g Officer Co. "A," 26th Inf'y., inviting attention to the 3d endorsement.</p> <p align="center">By order of Col. Spencer. H. E. ADAMS, 1st Lt. & Adj't. 26th Inf'y.</p>
<p align="center">CAMP SHERIDAN, VT. April 4, 1895.</p> <hr/> <p align="center">BROWN, JOHN H. Second Lieut. 26th Inf'y.</p>	<p align="center">SECOND ENDORSEMENT.</p> <hr/> <p align="center">H'D'Q'RS. 26TH INFANTRY, CAMP SHERIDAN, VT. April 5, 1895.</p> <p>Respectfully forwarded to the Asst. Adj't. General, Depart- ment of the Atlantic, approved.</p> <p align="center">JOHN A. SPENCER, Colonel Com'dg 26th Inf'y.</p>	<p align="center">FIFTH ENDORSEMENT.</p> <hr/> <p align="center">Co. A, 26th Inf'y., CAMP SHERIDAN, VT. April 6, 1895.</p> <p>Respectfully returned to Lt. Brown.</p> <p align="center">H. A. SMITH, Capt. 26th Inf'y. Comdg. Co. A.</p>
<p>Applies for a leave of absence for one month, from April 7, 1895.</p>	<p align="center">THIRD ENDORSEMENT.</p> <hr/> <p align="center">H'D'Q'RS DEP. OF THE ATLANTIC, NEW YORK CITY. April 6, 1895.</p> <p>Respectfully returned to the Commanding Officer, 26th In- fantry, disapproved. The exi- gencies of the service do not allow leaves of absence, at this time.</p> <p align="center">By order of Brig. Gen. Scott. R. A. FOSS, Asst. Adj't. General.</p>	

Communications from an inferior to a superior officer, or vice versa, as a rule, pass through the intermediate commanders. Communications from superiors to inferiors are answered through the same channels as received.

Official communications from a commander to those under his command are signed by staff officers. In all other cases by the commander himself.

Communications to the Secretary of War or Commanding General of the army should be addressed to the Adjutant General of the Army through intermediate commanders.

When addressing a communication the rank of the officer should precede his name, e. g. "Captain John H. Jones, 1st U. S. Infantry."

In signing an official communication the name is written on one line and on the next line below the rank and regiment are given, e. g. "John H. Jones, Captain 1st U. S. Infantry."

"Official Business" should be printed or written on the upper left hand corner of an envelope.

A copy of every letter and endorsement sent should be kept in a book known as "letters sent book," and there should also be a "letters received book" for recording communications received, which should become a part of permanent records; and there should be an index to each of these books.

BOARDS.

Proceedings of "boards" should be written on legal cap paper and sent by the recorder in an official envelope, addressed to the adjutant general or adjutant to the commander by whose order the board was convened.

(Model for proceedings of a board of survey.)

Proceedings of a board of survey, convened at Fort . . . , . . .
by virtue of the following order:*

Fort . . . , . . . ,

. . . , 189 , . . . o'clock, . . m.

The board met pursuant to the foregoing order. Present: all the members. The board then proceeded to the business before it, and after a careful consideration of the evidence contained in the affidavits of . . .
. . . , and . . . , hereto appended
and marked A and B respectively, and other evidence submitted to the board, finds that. . .
The board therefore recommends that. . .
There being no further business before it, the board adjourned *sine die*.

(Signature.) . . . ,

(Rank.) . . .

President.

*Here insert the order convening the Board.

(Signature.) ,
(Rank.) ,
Member.

(Signature.) ,
(Rank.) ,
Recorder.

Approved:

(Signature.) ,
(Rank.) ,
Commanding.

ORDERS.

The orders of commanders of armies, corps, divisions, brigades, regiments, posts, territorial departments and districts are denominated "general (or special orders)" of such army, corps, etc. General and special orders are numbered in separate series, each beginning with the calendar year, or the time of the establishment of the headquarters. They are also paragraphed, each paragraph being numbered and pertaining to only one subject.

General orders announce whatever it may be important to publish to the whole command. Special orders are such as do not concern all the troops, and are sent only to those whom they concern.

(Model for general or special orders.)

HEADQUARTERS OF THE ARMY,
ADJUTANT GENERAL'S OFFICE,
WASHINGTON, D. C., March 15, 189....

GENERAL (or Special) ORDERS, }
No. 40.

(Extract.)

1. Second Lieutenant H..... B....., is granted leave of absence for four months, from April 1, 18.....

* * * * *

By command of Major-General,
(Signed) L..... S.....,
Adjutant General.

Official:

..... ,
Aide-de-camp.

Orders issued by commanders of battalions, companies, or small detachments are simply denominated "orders," and are numbered in a single series, beginning with the year.

(*Model for company order.*)

COMPANY "A," FIRST INFANTRY.

FORT SCOTT, WYOMING, January . . . , 189...

ORDERS No 4.

1.
..

(Signed) H. L.,

Capt. 1st Inft. Com'dg. Co. "A."

Circulars issued from any headquarters are numbered in a separate series.

Orders and instructions will as a rule be transmitted through intermediate commanders in order of rank.

An order may be put in the form of a letter addressed to the individual concerned, through the proper channel.

(*Model for letter conveying an order by a staff officer.*)

HEADQUARTERS OF THE ARMY,

ADJUTANT GENERAL'S OFFICE.

WASHINGTON, D. C., January 1st, 189...

COMMANDING GENERAL,

ARMY OF THE HUDSON,

ALBANY, N. Y.

Sir :

By direction of the General of the Army, I have the honor, etc., etc..

* * * * *

Very respectfully,

Your obedient servant,

L———H— —

Adjutant General.

Orderly hours being fixed at each headquarters, the staff officers and chiefs of the special services either attend in person or send their assistants to obtain the orders of the day. The first sergeants of companies repair for that purpose to the regimental or post adjutant's office at "first sergeant's call."

RETURNS OF TROOPS.

Commanders of departments, posts or any separate body of troops, whether a corps, division, brigade, regiment or detachment will make monthly returns of their respective commands to the next higher authority on the last day of each month. In like manner captains will make monthly returns of their companies to regimental headquarters. In campaign, one copy of all returns of troops will be transmitted through intermediate commanders and one copy direct to the Adjutant General. These returns are all made upon blanks furnished by the Adjutant General of the Army.

MUSTER.

Every commanding officer is required on the last day of each month to "muster for pay" all troops under his command. The ceremony, therefor, is prescribed in drill regulations. Four copies of the muster rolls are made, one for the Adjutant General of the Army, one to be retained by company commanders who witness payments thereon, and two given to the paymaster who makes the payments, to use as money vouchers. The blank muster rolls are furnished by the Adjutant General of the Army and call for a complete identity of each soldier and all history affecting his pay, and it is especially provided in the fourteenth "article of war" that any officer who knowingly makes a false muster of man or horse shall be dismissed the service and thereby disabled to hold any office or employment in the service of the United States.

APPOINTMENT AND PROMOTION OF COMMISSIONED OFFICERS.

Appointments to the grades of commissioned officers of the army are made by the President, subject to confirmation by the Senate, and their commissions

are signed by the President. Notices of appointments and promotions are issued by the War Department through the Adjutant General of the Army.

Appointments to the grades of general officers are made by selections from the Army. Promotions to include the grade of colonel are made by seniority in each arm of the line, and in each staff department, subject to examination, up to the grade of major.

Vacancies in the grade of second lieutenant existing on the 1st day of July each year are filled by appointment in order as follows: (1) from graduates of the United States Military Academy; (2) from enlisted men of the army found duly qualified; (3) from civil life.

A soldier to be eligible for appointment must be a citizen of the United States, unmarried, between 21 and 30 years of age, and of good moral character both before and after enlistment.

A civilian to be eligible for appointment must be a citizen of the United States, unmarried, between 21 and 27 years of age. Both of the latter classes must be examined and approved as to habits, moral character, mental and physical ability, education and general fitness for the service by a board of five officers, appointed by the War Department; two members of the board being medical officers.

RECRUITMENT OF THE U. S. ARMY.

Any male citizen of the United States or person who has legally declared his intention to become a citizen, if above the age of 21 and under the age of 31 years, able bodied, free from disease, of good character and temperate habits, may be enlisted. The restriction in regard to age and citizenship, however, does not apply to soldiers who have served honestly and faithfully a previous enlistment in the Army.

Recruiting is conducted under the general supervision of the Adjutant General of the Army by officers appointed as "recruiting officers" at military posts, and other stations established in various parts of the country.

Minors, between the ages of sixteen and eighteen, are enlisted as musicians, with the written consent of parents or guardians, upon special approval of the

Adjutant General of the Army. Enlistments are made for the period of three years.

Soldiers take an oath to serve the Government honestly and faithfully during the term for which they enlist and obey all legal orders of their superiors, and after a man has enlisted he becomes a "deserter" if he leaves the service at any time unless properly discharged, and as a deserter, becomes liable to the punishment of death in time of war, and hard labor and imprisonment in time of peace.

THEORY OF OUR MILITARY ESTABLISHMENT.

Our military system is based upon volunteer armies hastily raised to meet the exigencies of war and then disbanded, except in times of general peace, a sufficient regular army to guard the indian frontier, garrison seacoast fortifications and keep alive the profession of arms.

The following is the order in which military forces of the United States may be called out :

1. Regular Army..... Present strength 2172 officers and 25,000 men.

2. Organized Militia. { State troops, volutarily enlisted in time of peace for state service, but which may be "called out" by the President under certain emergencies. Present organized strength, is 116,899 officers and men.

3. Volunteers. { The troops usually raised to meet the "call" of the President in time of war.

4. Drafted Militia. { Troops raised by draft from able-bodied male citizens between eighteen and forty-five years of age, when volunteer enlistments fail to meet the requirements.

5. Levee in Mass. { The final effort of the people to respond to the "call" of the President.

The President may, under the provisions of the constitution, call forth the militia of the several states to execute the laws of the United States, to suppress insurrection or repel invasion. The practice has usually been, when a greater national force than the regular army has been required, for the President to issue

a proclamation, calling upon the states for volunteers. The Governors of the several states have then established their recruiting stations and depots, and organized regiments, equipped them and appointed their officers, and upon notification that regiments were ready for United States duty, an officer of the army has been sent to muster them into the United States service, for the length of time required under the "call."

HISTORY OF THE ARMY OF THE UNITED STATES.

The history of the United States Army, of course, commences with the Revolution, and covers a little more than one hundred and twenty years. Prior to that time the troops of the colonies formed a part of the British Army.

During the Revolutionary War from 1775 to 1783, 290,000 officers and men were "in continental pay" and other militia organizations within the states participated in battles from time to time, to the number of 95,000 men and officers. But these were all militia or volunteer troops, and disbanded at the close of the war. In 1784 one company of *regular* artillery was authorized, 80 officers and men, but at that time the statutes provided that there should be no officer of higher rank than captain. When Washington was inaugurated as first President, five years later, the army contained 672 men and officers. After this the number was gradually increased year by year, until the breaking out of the second war with England in 1812. The total strength of the army at that time was 6,686.

The following table shows as nearly as can be given, the whole number of officers and men in the regular service during the

WAR OF 1812 TO 1815 WITH GREAT BRITAIN.

DATE.	OFFICERS.	MEN.	TOTAL.
July, 1812.....	301	6,385	6,686
February, 1813.....	1,476	17,560	19,036
September, 1814.....	2,395	35,791	38,186
February, 1815.....	2,396	31,028	33,424

The militia force during the war was 31,210 officers ; 440,412 men ; total 471,622.

There were in this war ten battles, eight combats and 52 lesser actions and bombardments, and the casualties reported were 1,877 killed, and 3,737 wounded.

After the close of this war the regular army was gradually reduced until in 1823 it numbered 6,000 officers and men. After this it was gradually increased until the breaking out of the Mexican war in 1846, when its strength was 8,613 officers and men.

The following table shows the number of men and casualties in the regular and volunteer forces during the

WAR WITH MEXICO, 1846-1848.

STRENGTH.	KILLED OR DIED OF WOUNDS.	WOUNDED.
Regular Army, 42,545	944	2,102
State Volunteers, 73,776	613	1,818
Total 116,321	1,557	3,420

During this war there were eleven battles and thirty-five combats and minor actions.

After the close of the war with Mexico in 1849 the army was again reduced to 10,320. But in subsequent years it was increased to 16,367 which was the strength of the regular army at the breaking out of the war of secession in 1861.

During the war of secession the regular army was increased to 50,000, and augmented by volunteers and drafted troops, until in May 1865 the federal forces in the field numbered, 1,000,516 troops.

The number of men enrolled and equipped in the northern army during the entire war was 2,690,401 including reenlistments. They were organized into the Army of the Potomac, Army of the Tennessee, Army of the Cumberland, and Army of the Ohio; the last three being finally united into the Military Division of the Mississippi. There were other separate commands during the progress of the war, but those above named were the principal sub-divisions of the Federal Army. Towards the close of the war the difficulty of obtaining volunteers so increased that large bounties were paid, in some cases amounting to as much as \$1,500 for one man. And eventually "drafts" were resorted to in the

states for filling quotas. The total number drafted during the war was 294,266. Of those drafted 73,607 furnished substitutes and 68,724 paid commutation.

The following table gives the northern and southern forces in the War of Secession from 1861 to 1865.

DATES.	FEDERALS.	CONFEDERATES.
January 1, 1861.....	16,867	Arming.
July 1, 1861.....	186,751	150,000
January 1, 1862.....	575,917	350,000
March 31, 1862.....	637,136	500,000
January 1, 1863.....	918,191	690,000
January 1, 1864.....	860,737	400,000
January 1, 1865.....	959,460	250,000
March 31, 1865.....	980,086	175,000
May 1, 1865.....	1,000,516	None.

There were 107 battles, 102 combats, and 362 actions, sieges and lesser affairs during this war.

The casualties in the Federal Army during the war numbered 349,000, and those in the Confederate Army somewhat more than 300,000.

The volunteers and drafted troops were mustered out at the close of the war, and the regular army reduced, till 1879, when the enlisted strength was fixed at 25,000, which has since continued to be its strength.

This brief account may serve to outline the four greater wars of the country in which volunteer troops have formed the bulk of our armies in the field, but beside these wars with civilized enemies a continuous indian warfare has been carried on by the regular army on the frontiers of the country. The Seminole Indian war in the gulf states lasted nearly a quarter of a century, covering most of the period between the war of 1812 and the Mexican war; in which more than 2,000 U. S. troops were killed. The Sioux massacre of 1862 gave the Army quite a casualty list; General Canby and portions of two companies were massacred during the Modoc war in 1872-73 in Northern California and Oregon, General Custer and his entire command of five companies of cavalry were massacred by the Sioux in Montana in 1876, and we can count up 650 battles, fights and actions against the Indians since 1812.

INSPECTOR GENERAL'S DEPARTMENT.

The duties pertaining to this department are to keep the War Department and the various commanders of military departments, separate armies, corps, divisions, brigades, etc., informed concerning the discipline, instruction, and all that bears upon general efficiency within their commands, and to protect the Government by frequent inspections of the disbursing accounts of officers, expending moneys appropriated by Congress for the support of the Army.

Besides the Inspector General, this department contains two colonels, two lieutenant colonels and two majors, who are assigned as assistant inspector generals at the various department headquarters. When there are not a sufficient number of officers belonging to this department to supply all of the places, line officers are detailed as acting assistant inspector generals.

The duty of inspectors is to a large extent of a nature confidential to the general under whom serving, but his field of work involves a thorough acquaintance with the practical details of all arms and departments of the service.

JUDGE ADVOCATE GENERAL'S DEPARTMENT.

This is the law department of the army. Besides the judge advocate general this department contains one colonel, three lieutenant colonels and three majors distributed among the several military departments, where as staff officers of the commanding generals they supervise charges preferred against those in the military service, and matters coming within the jurisdiction of military commissions, courts martial, courts of inquiry, etc. When there are not enough officers properly belonging to the department to fill the positions required, line officers are detailed as acting judge advocates on the staffs of the general officers.

THE LAWS OF WAR AND MILITARY COMMISSIONS.

It is only when the civil courts are closed by the declaration of "martial law" by the President, by congress, by a state, or by an independent military commander that military commissions are organized to sit and take cognizance of offences committed by persons not in the military service and of such offences

committed by officers and soldiers as in other times would come before the civil court. These commissions are governed in their proceedings by what are known as the rules and usages of war. Whence arise what we call the "Laws of War."

A military commission is a high and arbitrary function made necessary by a state of war and its members are usually of high rank and very carefully selected.

MILITARY LAW.

This comprises the statutory code known as the "articles of war," and other regulations and orders issued for the government of the army as a separate community, alike in peace and in war.

Military law proper is subordinate to the civil, and acts only when the latter does not, for the purpose of maintaining discipline within one of the executive departments of the government, namely, the Army.

COURTS-MARTIAL.

Military law is enforced through a tribunal called a court-martial convened by the President or by subordinate commanders for their own commands. Courts-martial are not a part of the "Judiciary" of the United States, and there is no "appeal" beyond the decision of the chief executive.

Their jurisdiction is entirely "criminal," and their function is to assign punishment, without authority to adjudge damages for private wrongs.

There are grades of courts-martial, gauged by the rank of the offender and the gravity of the offense. Only commissioned officers are eligible to be detailed for this duty. In addition to the members of the court, a judge advocate is detailed (except in "field officers courts" and "summary courts") to represent the government, advise the court, and record the proceedings, but he is not a member of the court. The members of the court act in two capacities—as judge and jury.

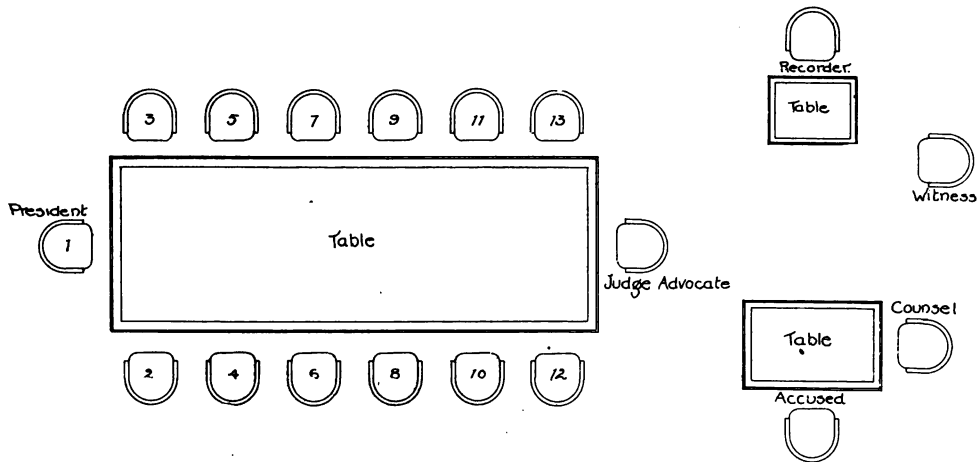
The senior member of a court-martial becomes its presiding officer, and the commander convening the court reviews the proceedings, and approves or

* See U. S. Army Regulations.

Courts-martial, in the absence of any specific statutory rules, are in general governed by the rules of evidence to be found in the common law.

GENERAL COURT MARTIAL.

The following diagram shows the arrangement of a court-martial room.



77

A general court-martial habitually sits in full dress uniform and side arms, witnesses attend in full dress uniform and side arms, and the judge advocate in undress uniform without arms. The accused, who holds the status of "in arrest," would attend in undress uniform and without arms.

FIELD OFFICER'S COURT.

The field officer's court is composed of a single field officer of the regiment to which the accused belongs. Its jurisdiction is limited to time of war, and its punishing powers are the same as that of a "summary court."

SUMMARY COURT.

The summary court consists of one officer,—the "line" officer, second in rank at the post or station of the command of the accused,—it has jurisdiction only in time of peace, and then practically takes the place of the field officer's court, which operates only in time of war.

This court cannot try officers or cadets; it can try only enlisted men; and enlisted men who object to trial by such courts must be granted trial by a garrison court-martial.

It can try only cases the punishment for which does not exceed confinement and forfeiture of pay for one month, and reduction of a non-commissioned officer to the ranks.

GARRISON COURT-MARTIAL.

This court is composed of three members and it also has a judge advocate.

In time of peace it has jurisdiction in cases where the accused objects to trial by a summary court, and in some cases where the composition of the command is such that this latter court does not apply. In time of war, the garrison court-martial has jurisdiction only when the field officer's court does not. Its punishing power is limited to that given above for the summary court.

REGIMENTAL COURT-MARTIAL.

The regimental, like the garrison court-martial, is composed of three members and a judge advocate. It has jurisdiction only within a regiment or partic-

ular corps, and its punishing power is practically the same as the garrison court-martial.

The following is a model form for charges and specifications :

“Charge and specifications preferred against Private A..... B..... Co....., U. S. Infantry.”

Charge—“Disobedience of orders, in violation of the 21st Article of War.”

Specification—In that Private A..... B....., Co.,U. S. Infantry, having received a lawful command from his superior officer, 2d Lieut. C..... D....., Infantry, to (insert order), did willfully disobey the same.

This at, on the of, 18....,

C..... D.....

Captain, Infantry,

Officer Preferring Charge.

Witnesses :

1st Sergeant E.....F....., Co.....,Infantry.

Private G.....H....., Troop....., Cavalry.

Mr. L.....K....., Citizen.

MOOT COURT-MARTIAL.

At colleges and schools having a military organization and a theoretical military course of instruction, moot courts-martial, under the supervision of an instructor, held for the purpose of trying feigned cases are good object lessons which the students will retain in mind as a model whenever they may have occasion for participating in such proceedings, and in such courts the “Manual of Courts-Martial” prepared by direction of the Secretary of War in 1895 should be followed, and the form for “record of a general court-martial” is given in that book.

COURTS OF INQUIRY.

These are tribunals consisting of from one to four officers and a recorder, who is also an officer, convened for examining transactions of, or accusations or

imputations against officers and soldiers. They cannot be ordered except upon the demand of the person whose conduct is to be inquired of. The proceedings are conducted similarly to those of courts-martial. They pronounce no sentence—only offering opinions based upon facts established in evidence.

QUARTERMASTER'S DEPARTMENT

This is the great supply department of the army, supplying clothing, camp and garrison equipage, stationery, fuel, forage for animals, and all means of transportation. It builds roads, bridges, railways, boats, docks and wharves, and the military posts, (not considered as permanent fortifications), and has custody of public buildings and lands in use by the army. It requires business capacity in its officers of the highest order, and in time of war its efficiency regulates very largely the success of the army. Besides the quartermaster general at Washington, D. C., the department contains four colonels, eight lieutenant-colonels, fourteen majors and thirty captains who are assigned as chief quartermasters at the various headquarters and as depot quartermasters at convenient points over the country. Besides the officers properly belonging to this department, each regiment has one of its lieutenants detailed as "regimental quartermaster" and every post or separate command—even if only one company—must have some officer detailed as acting assistant quartermaster. This usually falls to the lot of lieutenants of the "line" who all, in course of time, get more or less of this business training, which is highly important experience for fitting officers for promotion to higher grades where they conduct large operations. If they do not know all the details connected with moving and supplying armies they are not fitted for planning and fighting battles successfully.

TRANSPORTATION.

Supplying and managing the transportation of an army is one of the most important duties devolving upon the quartermaster's department, into which enter the strength and composition of the forces, the nature of the country, the soil and how rain affects it, the streams to be crossed and nearly all the business occupations in civil life.

WAGON TRAINS.

The number of wagons allowed depends upon the nature of the service and the amount of baggage and supplies to be carried with the command. On western frontier service, there is usually allowed for a squadron of four troops of cavalry, two wagons to each troop, one for the major and staff, and one ambulance, making for the squadron a train of nine wheeled vehicles. This is the allowance for an ordinary trip when tents and five days' rations are carried. An infantry battalion would have less wagons, as only forage for mules is required, while cavalry horses have to be provided with grain.

If the cavalry graze their animals instead of feeding grain, as is frequently necessary, their number of wagons would be reduced, while if either cavalry or infantry were changing station and taking along all baggage, larger trains would be necessary.

In actual field* service in war when the troops bivouac and each soldier carries his clothing and two days rations' upon his person, but one wagon is allowed to each battalion for baggage, and officers are allowed baggage as follows :

Major General	1000	pounds
Brigadier General.....	700	"
Col., Lt. Col., or Major,.....	500	"
Captain.....	200	"
Lieutenant.....	150	"

On the road a 6-mule team is calculated to occupy 17 yards in depth, or 100 wagons to a mile. The quartermaster of each command forms the wagons pertaining to his command into one train which he personally conducts on the march.

PACK TRAINS.

Pack trains are used, when the nature of the country will not permit wheeled carriages to pass, and a certain portion of the *means of transportation* with every cavalry regiment should consist of pack trains, to be used by

*Lecture No. 1, page 13, and Lecture No. 2, page 42.

troops or squadrons on detached service, so that they may move regardless of roads. As time goes on, pack animals will probably come into more extensive use with infantry as well as cavalry for supplying the fighting line with ammunition, and packing machine guns, where wheels cannot go.

Horses and ponies are occasionally used as pack animals, but the mule is the favorite pack animal in the United States, the same as for wagon transportation. In other countries, the elephant, camel and the ox are extensively used for this purpose, and many even in this country advocate the use of the ox as a pack animal because he is much cheaper than the mule, and in cases of emergency may be killed for beef.

The great superiority of the mule over other animals, is that he will stand a greater amount of abuse and starvation and will suffer but little from the effects of a hard drive, and also that he is more intelligent and tractable.



Fig. 19.

Figure 19 illustrates the cross-tree, saddle and gear used in packing. From 150 to 200 pounds are carried upon each animal, the cargo being made up in two packages of equal bulk and weight and one of these securely lashed to each side of the pack-saddle. Each cavalry troop should have a train of twelve mules for field service.

The "packing drill" is in the cavalry drill regulations.

RAILROAD TRANSPORTATION.

Railroads have come to play so important a part in modern warfare that their construction, use and preservation are now prominent features in an army officer's education.

Students in the civil engineering courses in our colleges need but a few suggestions to enable them to see how to turn their education to the advantage of the government in case of war. The transportation of rations and materials of war, and the concentration of troops for battles, are to be accomplished largely by railroads. The "division wagon trains," and "pack trains" for the cavalry, will of course, be required in the vicinity of the fighting lines. But supplies from the base of operations and from depots will be forwarded to where the division teams will receive them, by rail, and the wagon trains together with the large armies to which they belong, will have to be carried back and forth over the country by rail to meet the demands of strategic operations. Our own railroads must be repaired and operated, new ones frequently built, and damages repaired upon those abandoned by the enemy. The provision and detailed arrangements for transportation by rail fall to the lot of the quartermaster's department, and the operations connected with loading and unloading the trains fall to the lot of the regimental and battalion quartermasters, under the direction and supervision of their respective commanding officers, and all officers should have a thorough acquaintance with such details. The rate of travel is to be determined by the commanding officers, usually from 15 to 20 miles per hour, with stops at least once in each 24 hours for unloading, feeding and watering animals, and every three hours short stops should be made for the men.

There must be platforms of some kind supplied for loading and unloading, as well as store-houses or tentage for perishable articles. Skids of wood or sliding platforms for artillery pieces, wagons and horses, should be provided and carried on trains, so that embarkation and disembarkation may be accomplished speedily where there are no stations or material at hand for improvising platforms. Men are usually put in passenger cars which carry 60 men comfortably, and 90 if crowded. The smaller coaches seat

but 50, and for long journeys the emigrant sleepers are used, which accommodate 35 to 40. Officers are furnished the regular sleeping cars when practicable. When passenger coaches are not procurable, box cars must be fitted for such use. The cars are assigned by the quartermaster, each car being marked with the letter of the company, and the number of regiment it is to carry. The sub-divisions of a command are marched to the platforms, or near the cars, and loaded as may be directed by the commanding officers. Usually knapsacks are taken off, cartridge boxes, canteens, etc., slung around to the front of the soldiers, and the men filed into the cars in their order in ranks, each man retaining possession of his gun and accoutrements. A commissioned officer should be assigned to each car. The approaches to the train should be kept clear by sentinels, if necessary, troops marched to their position at attention and silence preserved until the cars have started. For loading the horses, baggage, artillery pieces, wagons, etc., fatigue details are made from the commands to which they pertain, and the loading goes on simultaneously in the different parts of the train. Under a well regulated system it requires but a short time to put a command upon a train of cars ready to move.

For short trips horses may remain harnessed or saddled, supplies loaded in wagons, and the wagons hauled on to the cars, as packed for the road. Box cars or flat cars are used for stock. Artillery horses are unhitched, and teams kept together, with sections and platoons in the same car as far as practicable. Mule teams for the wagons should be kept together in the same way. For long journeys, animals are unharnessed and unsaddled, and the harnesses and equipments of each section, team, troop, etc., marked and kept together in special cars. Guns and their carriages, and wagons are carried upon open platform cars, strips being nailed on the sides in front and rear of the wheels to keep them from slipping, and no part left to project beyond the car. The baggage of each company, troop or battery, should be kept on the same train with it, and the baggage cars and stock cars marked the same as the coaches.

Commands disembark under the same system as explained for embarkation, and as fast as they leave the cars are marched to a position suitable for formation, or put in camp or bivouac.

Platform cars are about 28 feet long and 8 feet wide and each will carry two field pieces with their caissons or two siege guns with carriages and limbers complete, or two army wagons standing, with considerable baggage packed around them. If the wagons are knocked down four may be put on a car. 30,000 pounds is the maximum load for freight cars and 24,000 pounds is reckoned as a safe load over the average road. From 14 to 17 horses or mules are put in each box car, depending upon the size of the animals. It is best to have as many as will go in, as they ride better when the car is full. The horses or mules should all face toward the same side of the car and are hitched by their halters to the frame work.

A railroad used to connect an army with its *base of supplies* must be thoroughly guarded, as it is the business of the enemy's cavalry to destroy it if possible, and at every unguarded place they will ride in to tear up the track and destroy bridges and tunnels, which with modern appliances can be accomplished very quickly.

When there is any probability of danger along the route, a guard train should precede the main column, with proper tools for repairing the track and telegraph line, and removing obstructions. And every train should have a telegraph operator, with portable instruments, so as to tap the wires, and communicate from any point.

Military railroading is so extensive a subject, that it can only be outlined here. It is usually treated under three heads, viz: railway construction, railway destruction, and railway management.

To supply an army of 100,000 men in the field, by means of a single line of track, the proportion of rolling stock should be one engine and 24 freight cars to every four miles of road, and this does not provide for the conveyance of troops.

Enough may here have been given to enable an educated man to apply his education and good judgment, and hastily prepare for moving a command by rail. There is now such an army of practical railroad operators and workmen in the country, that almost anywhere efficient men can be employed to fill the different positions in operating and constructing railroad. It may be almost safe

to assume that they would be found in the ranks of every volunteer company in case of a war.

WATER TRANSPORTATION.

In the United States Army there are no vessels kept especially fitted up for the transportation of troops and materials of war, still our rivers and seas and even the ocean are constantly used as ways of transportation for the army, and it frequently happens in times of peace that one of the first duties of a lieutenant upon joining his regiment is to supervise the loading and unloading of river boats, and in case of war it might very naturally be one of the first duties falling to the lot of volunteer officers, to move a command upon sea going vessels. In any foreign war, except with Mexico or Canada, ocean transportation would be extensively used. During the war of the Rebellion there were at one time 400 sea and bay going crafts employed at the quartermaster's department at Alexandria, by which from 1000 to 3000 tons of coal were used daily. When embarking and disembarking are accomplished with wharf facilities, it is comparatively an easy problem. Animals may be led on by the use of gang-planks and artillery pieces, wagons, etc., run on by hand, and these gang-planks carried by the vessel ready for disembarking. When it is not practicable to use gang-planks, animals are hoisted on board by means of a sling and lifting tackle and are unloaded by the same means. Other supplies and munitions are landed in the same way.

If the voyage is short and the water smooth, stalls are not absolutely necessary for animals on board ship, but when a voyage is to cover several days, and likely to be rough, stalls should be fitted up between decks. Horses stand best athwart-ship, as in this position they best accommodate themselves to the rolling motion of the vessel, and when on the upper deck they should face inward, that the spray will not strike them in the face, and also because they will suffer less from fright and nervous excitement when facing each other.

A vessel of twenty-five feet beam will accommodate two rows of horses, leaving sufficient space between the rows and the croups of the horses and the sides of the ships, for the operations of feeding, watering and cleaning out, which

should be performed twice a day as in garrison. They stand better when close together. Stalls and arrangements for securing horses must be strong beyond any possibility of giving way, as the force exerted by a row of horses as they swing with the motion of the ship in a heavy sea is very great, and the horses will be about ruined if the fastenings give way. In loading vessels with stores for a military expedition, the cargo of each should be composed of an assortment of such stores as may be available, in case of the non-arrival of others, and they should be so placed that they may be reached in the order in which they are required for service. A list should also be made of the stores on board of each vessel and the place where they are to be found in it, and a copy given to the officer who is to have charge of their use or disembarkation. Each boat should be marked at the bow and stern, on both sides, in large characters with a distinctive letter and number.

The act of landing troops and munitions of war from a boat or ship at a wharf is simply the reverse operation of embarking.

Transports should be provided with the essential articles for landing their cargoes where wharf accommodations are not available. Each transport should carry four pontoon boats and the equipments for two rafts. By putting these pontoon outfits together, several transports will be able to form a bridge to the shore, or construct rafts, on which to land their cargoes.

The operation of disembarking, then, consists in bringing each transport alongside of the wharf-head of the bridge, and using gang-planks, or else lowering the cargo by means of sling and tackle. At a last resort animals may be swum ashore and materials landed in the ship's boat, the horses being lowered over the side by slinging. It is a bad plan at all times to plunge the horses from the boat into the water even if the deck of the vessel is low, as it is liable to strain and injure the animal and will ever after make him timid and shy about taking the water when it is necessary to cross streams on the march.

TENTS AND CAMP EQUIPAGE.

The Quartermaster's Department furnishes all tents for officers and men and the camp equipage, such as cooking utensils, shovels, axes, drums, trumpets, etc.

FUEL AND STATIONERY.

Fuel and stationery are supplied by the Quartermaster's Department, according to tables of allowances contained in Army Regulations:

BARRACKS AND QUARTERS.

Barracks and quarters for troops in garrison are provided by the Quartermaster's Department.

PUBLIC ANIMALS.

The Quartermaster's Department furnishes all public animals and the forage and veterinary medicines consumed by them. Cavalry and artillery horses are turned over to troop and battery commanders, and the forage, medicines, etc., are issued for limited periods by regimental or battalion quartermasters upon requisitions signed by troop and battery commanders, and approved by the regimental or battalion commanders. Officers provide their horses but the Quartermaster's Department furnishes their forage as for public animals.

CLOTHING.

Clothing for enlisted men is furnished by the Quartermaster's Department. Company, troop and battery commanders secure it from the regimental or post quartermaster upon requisitions approved by the "commanding officer" and issue it directly to the men.

Officers purchase their uniforms and equipments.

SUBSISTENCE DEPARTMENT.

This department supplies the rations for enlisted men and such civilian employees as are entitled to them. It also furnishes in addition to the articles making up the regular rations, grocery stores, towels, sewing materials, etc., that officers and enlisted men wish to purchase for their own use, and funds for constructing ovens for baking the bread.

Besides the chief of this bureau in Washington who ranks as a brigadier general, this department contains two colonels, three lieutenant colonels, eight

majors and twelve captains who are detailed at the various department headquarters, as chief commissaries on the staffs of the commanding generals, and as purchasing officers in large cities.

In time of peace, at each military post and with each separate command in the field, a lieutenant of the line is detailed as acting commissary of subsistence, who performs all the duties pertaining to the subsistence department within that command.

In time of war, volunteer troops usually have a regimental commissary on the staff of the colonel.

RATIONS.

A ration is the established daily allowance of food for one person.

The U. S. Army ration is as follows;

ARTICLES.	ALLOWANCE.
<i>Meat Ration.</i>	
Pork	12 ounces per ration
or Bacon	12 " " "
or Salt Beef	22 " " "
or Fresh Beef	20 " " "
or Mutton	20 " " "
or Fresh Fish	18 " " "
or Pickled Fish	18 " " "
or Dried Fish	14 " " "
<i>Bread Ration.</i>	
Flour	18 ounces per ration
or Soft Bread	18 " " "
or Hard Bread	16 " " "
or Corn Meal	20 " " "
<i>Vegetable Ration.</i>	
Potatoes	16 oz. (or potatoes 80%, onions, 20%.)
or Beans	15 pounds per 100 rations.
or Peas, dried	15 " " " "
or Rice	10 " " " "
or Hominy	10 " " " "

Coffee and Tea Ration.

Coffee, green	10 pounds per 100 rations.
or Coffee, roasted	8 " " " "
or Tea, black or green	2 " " " "

Other Articles of the Ration.

Sugar	15 pounds per 100 rations.
Vinegar	1 gallon " " "
Candles	24 ounces " " "
Soap	4 pounds " " "
Salt	4 " " " "
Pepper, black	4 ounces " " "
Yeast powder	4 pounds " " "

When troops travel without cooking facilities, 75 lbs. of canned beef and 33 lbs. of canned baked beans per 100 rations may be issued in lieu of the above meat and vegetable rations.

Captains draw the rations for their men in bulk from the commissary office of the command and the raw material is converted into food at the company kitchen.

Officers purchase their subsistence stores from the commissary or elsewhere at their option and have their cooking done at their separate "messes." Officers of a company usually mess together in the field and there is a headquarters' "mess" in each regiment.

It was confidently asserted in publications during the war of the Rebellion that no army in the world was so well provided for, in the shape of food, either as to quantity or quality, as the Army of the United States, and in later years the ration has been greatly improved, and the economy of cooking so thoroughly studied by officers that with the latitude allowed company commanders, in exchanging rations saved, for articles not supplied, an inviting table may be set in the company mess hall.

Besides having a knowledge of cooking and preparing food, sufficient for instructing the cooks, officers should be conversant with the nature and quality of

meat, and the way in which oxen and sheep, when killed, are divided into joints. And such regulations should be adopted that all soldiers in the course of time will become fair cooks, so that on detached service any man will be able to cook his own rations.

COOKING UTENSILS.

Troops in quarters are generally provided with cooking ranges or stoves, furnished with suitable fixtures. In the field the utensils are of the most primitive character, consisting of iron camp kettles, mess pans, frying pans and tin tea pots.

To extemporize stoves and cooking places, the most simple mode is to dig a trench eighteen inches wide, twelve inches deep, and from four to six feet long. At each end place a forked stick, with a stout sapling extending from one to the other, from which to suspend the kettles.—See figure 20.

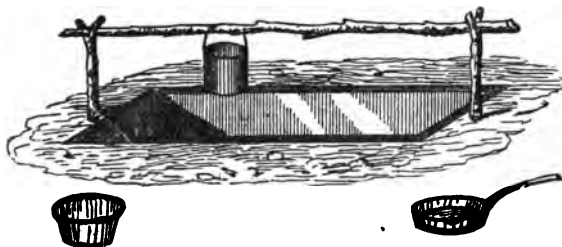


Fig. 20.

— Dough may be mixed in mess pans, on a piece of canvas, on a rubber blanket, or in a flour barrel or flour sack. Empty tomato cans, etc., can be used as vessels in which to draw tea, make coffee, etc., in the absence of coffee pots.

MEDICAL DEPARTMENT.

Besides the Surgeon General at the head of this bureau at Washington, with the rank of brigadier general, this department contains six colonels, ten lieutenant colonels, fifty majors, eighty-one captains and forty-four first lieutenants. They are officially designated surgeons down to include majors, while the captains and lieutenants are designated assistant surgeons. The higher officers of this department are assigned to the various department head-quarters as medi-

cal directors on the staffs of the commanding generals. The others are assigned as post surgeons and assistants at military posts. Two or three medical officers are stationed at some of the large posts, from which they are sent into the field with commands that are ordered out. Every post has a well equipped hospital with a dispensary. This department supplies all medicines used in treatment of the sick.

In the field with large commands, white flags, with the conventional "red cross" mark the general and field hospitals, and the way to these hospitals.

In time of war, a surgeon and two assistant surgeons are attached to each regiment.

Besides the officers in this department there is what is termed a "hospital corps," consisting of one hundred and six hospital stewards, eighty-nine acting hospital stewards and five hundred and seventeen privates. These perform all the *hospital service in garrison and in the field, and render the necessary ambulance service under the officers of the medical department. Army regulations further require that in each company, troop or battery, four men, to be known as *company bearers*, be designated for instruction in the duties of litter-men, and the methods of rendering first aid to the disabled. During an engagement, acting under orders of their commanding officers and supervision of their regimental surgeon, they render first aid to their wounded comrades and carry them to the rear. Upon being relieved by members of the "hospital corps," they immediately join their companies.

Women are employed at post and general hospitals as hospital matrons who do the laundry work for the sick.

As disease causes about twice as many deaths as battle, and of those wounded in action, probably two-thirds may recover under proper treatment, it is the purpose of the government to keep the medical department upon the highest possible basis of efficiency, not only as regards the personnel of the corps, but also the instruments and medical appliances used.

It is the intention to furnish one doctor with every command as large as a company, and commanding officers, unless acting under emergencies, give great

* Lecture No. 1, page 15.

weight to the opinions of the medical officers belonging to their staffs, and to hygienic considerations affecting their commands.

Subaltern officers of the line are sent on many expeditions in command of small detachments unaccompanied by a doctor, and the study of both military hygiene and practical treatment of the sick and injured should form a part of every officer's education.

MILITARY HYGIENE.

*Military hygiene means the care of troops. This duty is ever present and concerns not only medical officers but the staff officers who supply food, clothing and the habitations of troops, as well as the line officers who control the daily lives of their soldiers. Commanding officers should look well to selecting healthy sites for posts and camps, to water supply and drainage, and to the enforcement of rigid police regulations. And every company commander should, by a due study and observation of the laws governing health, direct the personal hygienic life of every man in his company, see that he cultivates habits of cleanliness, habits of temperance as well in eating as drinking, habits of exercise, habits of physical improvement, habits of bathing and habits of regular sleep.

In building and assigning barracks, the proper amount of air space (from 600 to 1000 cubic feet per man) should be allowed, and the problem of ventilation carefully studied by company officers together with the science and art of supplying wholesome and inviting food for the company mess.

Vaccination as a practical immunity against small-pox, must be carefully attended to. Vaccination in infancy repeated at the age of 14 or 16, will generally suffice, still every recruit must be presented for examination as soon as he joins his company, and in every company a record kept concerning the vaccination of every man therein.

Under clothing should contain about 30 per cent cotton and 70 per cent wool—what is usually called merino—as this combination is considered the best for all climates and conditions of service.

*See "Military Hygiene," by Dr. Woodhull, the authorized text-book for the army.

In the field soldiers habitually wash their own clothing, many do so in garrison, and every soldier should know how to do his own "mending."

Soldiers should be dressed as nearly alike as possible throughout the army, as a uniform has obvious military advantages, though there must be some sanitary modifications allowed in the different climates. Color in clothing is a physiological as well as a military consideration. Cadet gray is the best color and next to it butternut dye, but blue will probably always remain the color of the United States uniform upon traditional considerations. Colors draw fire in action, in proportion to their conspicuousness, viz: 1 red, 2 white, 3 black or dark blue, 4 light blue, 5 butternut, 6 dust gray.

Color does not influence bodily heat or the external temperature except as directly derived from the sun, but protection against the sun's rays depends entirely upon color irrespective of texture. White absorbs the least heat and is consequently the coolest, black the most and is warmest, and blue is next to black. For these reasons troops are issued drab campaign hats instead of black. A thin white cotton tissue worn over a dark cloth will reduce the temperature 12.6° F.

Absorption of odor depends partly upon texture and partly upon color. Black absorbs odors the most, blue next and white least. White canvas stable frocks and overalls are therefore issued to cavalrymen, for use in grooming their horses.

Campaigns are won by good marching as much as by good fighting, and officers should be mindful of the care of men's feet as well as of the feet of horses. Even in the cavalry a large part of the duty must be performed on foot, and boots and shoes are potent to preserve or damage those important members. Stockings also must be looked to, that they fit the feet, do not wrinkle, and are kept clean and properly mended. When unaccustomed to marching, the feet should be soaked or greased before starting, to prevent chafing. At the end of the march they should be washed or wiped very clean and dry.

It is only intended here, to call to mind, in a general way, enough of military sanitation, to fix upon the student's mind the broad field of science that lies between the drill regulations and the practical work of commanding men in act-

ive service, and that "soldiering," considered in its practical details, finds use for what students learn in all the departments of civil science.

PAY DEPARTMENT.

This department pays officers and soldiers the salaries allowed by law. Officers are paid upon their own certified pay accounts, and soldiers upon "muster and pay rolls," made up and signed by company commanders, approved by mustering officers, who are the commanding officers of the posts, regiments or separate battalions.

Besides the paymaster general at Washington, the department contains two colonels, three lieutenant colonels and twenty-nine majors. The senior officers of the department are assigned as chief paymasters on the staffs of the various commanding generals, and the others are stationed at convenient points in the country, from which they make monthly or bi-monthly payments to troops as they may be ordered by the department commanders.

This department also pays the mileage allowed officers travelling on duty, when transportation in kind is not provided by the quartermaster's department, and commutation of quarters when officers do not receive their quarters in kind.

CORPS OF ENGINEERS.

This is a scientific corps, which in time of peace is considered as a staff department. It, however, contains what is known as the "engineer battalion" of four companies, organized somewhat like the infantry, though having "first-class" and second-class" privates. The former class receives a higher rate of pay than the latter, and are skilled men.

Besides the chief of engineers at Washington, who ranks as a brigadier general there are in this corps six colonels, twelve lieutenant colonels, twenty-four majors, thirty captains, twenty-six first lieutenants, and ten second lieutenants, who in time of peace are employed in constructing the permanent defences of the country, or are detailed to take charge of the river and harbor improve-

ments, such as constructing break-waters, opening channels for the navigation of rivers, superintending the erection of government buildings, etc., and the younger officers are detailed as engineer officers on the staffs of general officers.

In time of war this corps becomes practically an "arm" of the "line," organized into companies like infantry, to be assigned to the different *army corps as sappers, miners, pioneers, etc. The details of the field work of this department will be treated under the head of "military engineering," lecture No. 9.

†SEA-COAST AND HARBOR DEFENSES.

The means of defense of the country are usually classed as follows :

First or exterior line—the Navy.

Second—Land fortifications, including sub-marine mines and torpedos.

Third—Interior communications by land and water.

Fourth—The regular army and organized militia.

Though the Army and Navy are distinct branches of the service, they must be co-ordinate and co-operative. Naval construction is conducted by officers of the Navy, while the land fortifications are planned and constructed by the Engineer Corps of the Army. These land fortifications must not only be so constructed as to afford security and refuge for the commercial marines, protect the naval depots and serve as the base of operations for naval fleets, but must be complete in themselves for the defense of the principal cities and harbors, when the floating defenses shall be called to operate in other parts. The field of work for the engineer corps of the Army, in connection with the sea-coast defenses, becomes more important year by year, as our sea-board cities grow in wealth and population.

Previous to the Revolution our seaports were mere villages and naval establishments and military depots were unknown. A small work of sand and palmetto-logs in Charleston Harbor, South Carolina, was about the first effective work

* Lecture No. 1, page 15.

†General Abbott's "Defence of the Sea-coast of the United States" should be a reference book in this connection.

at fortification in this country. Here Colonel Moultrie, with 30 guns on land, against 270 afloat, in 1776, decisively repulsed the attack of a British fleet and taught our people the value of fortifications. After the Revolution, Fort Columbus, Castle Williams, and Castle Garden were built in New York Harbor, and in nearly all of our chief ports, batteries were constructed, though they were defective in design and weak and perishable in material. This, however, commenced what is known among engineers as our second system of defense in support of the Navy, and did some service in the war of 1812.

No sooner had this war ended than the defense of the Atlantic sea-board was seriously taken in hand and during the coming forty-five years the casemate system was perfected. This system of admirably constructed forts was completed about the commencement of our War of Secession. These forts were built of masonry, usually, placed but little above the water level, rising in one, two or three "casemates" and surmounted by a tier in "barbette." Fig. 21 represents in ver-

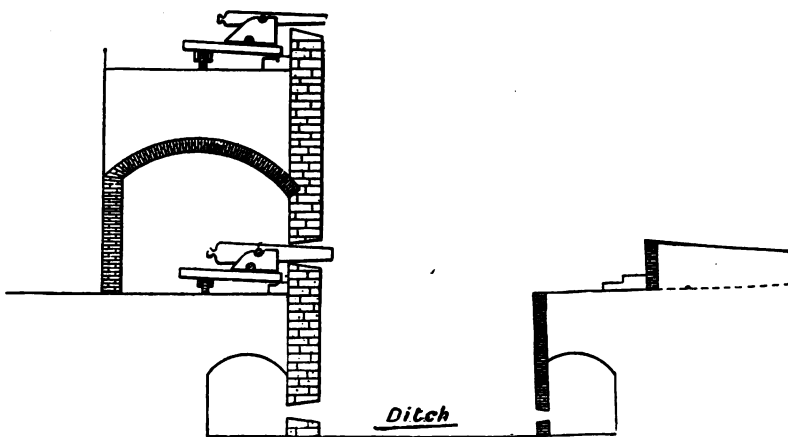


Fig. 21.

tical sections, a fortification of this old school type, and such as are still seen at the entrances of our principal harbors, monuments to the engineering skill of the day of smooth bore guns, but almost useless against the rifle ordnance of the present day.

In the permanent works of to-day, iron is, in a large measure, superseding all other materials and modern fortifications have taken the form of turrets—revolving or stationary—cupolas, casemated or iron-clad batteries of cast iron, wrought iron or steel.

Most of the European powers, except France and England, have adopted the “Gruson” chilled cast iron plate for turrets. These are cast in curved form, the largest plates having a thickness of 49 inches at the centre, and decreasing towards the top and bottom.

Fig. 22 gives the exterior view of a “Gruson” chilled iron armor, stationary six-gun battery.

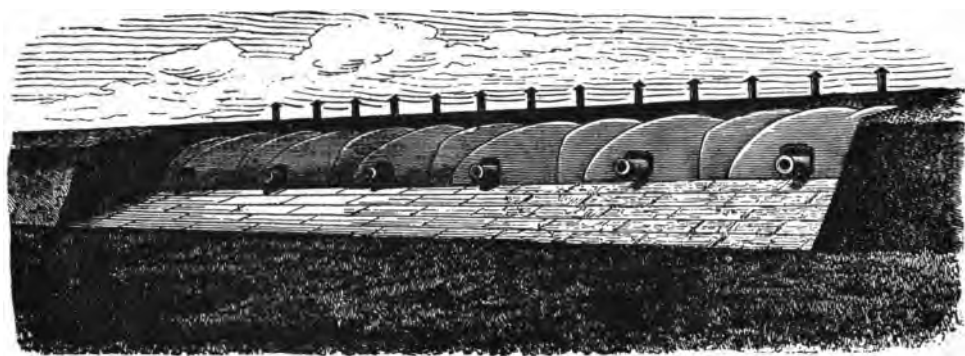


Fig. 22.

At each end the battery rests against masonry, which is protected by earth parapets against shot. In front of the battery is a concrete glacis covered with granite blocks.

England is using wrought iron in construction of turrets, and France is using all steel plate.

Compound plates of wrought iron faced with steel or of cast-iron are likely to be used in the future. The cost of the chilled iron plates is from \$150 to \$200 per ton, wrought iron plates from \$220 to \$230 per ton, and all steel plates about \$330 per ton, while the compound plates cost as high as \$450 per ton. These figures may serve to give the student a little idea of the cost of modern fortifications.

Fig. 23 gives a vertical section of one of the "Gruson" chilled iron revolving turrets.

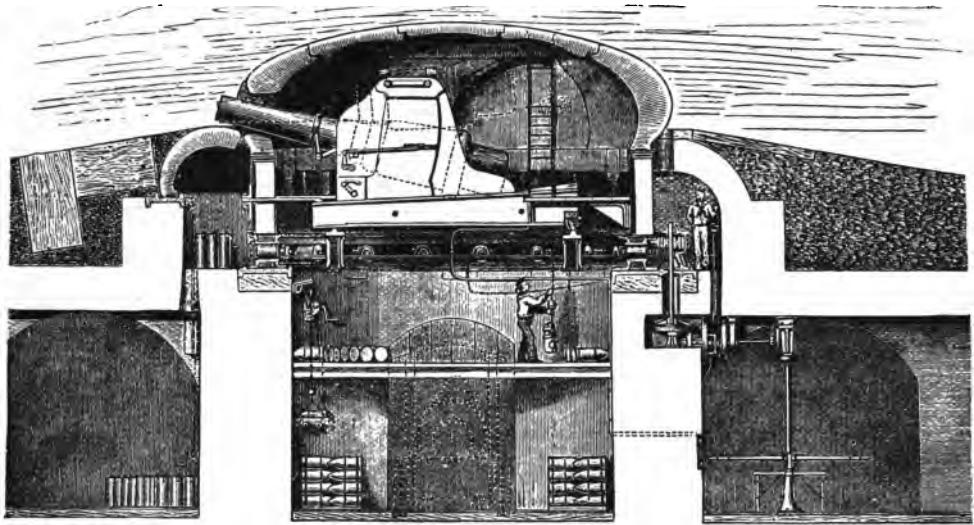


Fig. 23.

In construction of land defenses for harbors and cities, a continuous line would not be attempted, but instead lines of detached works placed at commanding points, and in defensive relation to each other.

General Abbot of our Engineer Corps states in his "Defence of the Sea Coast of the United States" that, "A sea coast fortress of today, suited to the needs of this country consists of a central 'keep' provided with bomb-proof quarters and arranged for a vigorous defense; of detached high power gun batteries (turrets, iron casemates, lifts, barbette batteries for disappearing guns, open barbette batteries, etc., according to circumstances), so placed as to sweep the channel and approaches, but with ample space between their sites to prevent mutual interference; of detached mortar batteries, usually in rear of the guns, and so far as possible, out of sight of the enemy; of machine guns in covered positions to sweep slopes and approaches, and the interior of the batteries in case of surprise; of wire and other entanglements to check the advance of the escalade par-

ties from boats ; of secure operating rooms, cable shafts, galleries, and flanking guns for the mined zones ; of position-finders suited to the locality, for determining ranges and controlling the fire of the guns and the operation of the mines from the station of the commanding officer ; of suitable arrangements for sweeping the approaches by the electric light, and for using movable torpedoes under control from the shore."

Applying this scheme to the harbor of New York, for example :

Sandy Hook, Coney Island, Staten Island, Fort Schuyler and Willetts Point suggest themselves as the sites to be fortified. We will assume as an illustration the following, as necessary for the complete defense of New York harbor, viz., Sea coast fortress for mounting two 16-inch guns, twenty 12-inch guns and forty 12-inch mortars ; four hundred mines with their cables, etc., complete ; two operating casemates for these mines with cable shafts, etc., and one "keep" with flanking arrangements for the batteries.

The estimated cost of such defenses for the harbor is about \$3,300,000.

It is not the policy of our government to fortify on so extensive a scale as this, all at once, but it has commenced a good system of defenses on a more economical and progressive scheme in our principal harbors, and in the course of a few years, by moderate appropriations, it is proposed to make our land defenses adequate to stand off any naval vessel afloat.

The statesmen of the country of all parties seem to have recently awakened to the necessity for some adequate provisions for protecting certain harbors where centre the wealth, trade and commerce of the nation, and which a few years ago had come to be at the mercy of any maritime enemy, through our inaction in the matter of defenses, during the age of transition from smooth bore guns and masonry armor, to high-power rifle guns and iron armor. Fourteen strategical points naturally suggest themselves for fortifications, Portland, Me., Boston, Newport, R. I., New York, Philadelphia, Baltimore, New Orleans, San Francisco, the Lake Ports, Hampton Roads, Virginia and Washington, D. C.

It is proposed to extend appropriations over about 10 years, making an annual expenditure of only about two-tenths of one per cent. of the destructible property involved. It is the business view of the situation, to expend this as an insurance premium. A more important consideration is in the national humiliation that we invite, by leaving our ports in an unprotected condition while the rest of the world is actively awake.

The subject of national defences cannot be treated here in detail. It is only the intention to outline it sufficiently to call the attention of young men who are soon to come into the business and political positions of the country, to a subject that the public generally have given very little attention during these later years of our prolonged peace, but which must receive more attention if we wish to make this peace secure and perpetual.

Several times during the past ten years the prominent officials of the government have had to admit their anxiety lest some of the smaller powers, with which we have had diplomatic differences, should send ironclad vessels into our ports and exact a heavy tribute under threat of laying the cities in ashes, which they could easily have done. Though we are at peace with the world, it cannot be disputed that there is much latent hostility against us among foreign nations.

We must be mindful or our foreign policy will lack self-respect and our government be humbled in its diplomacy.

SUBMARINE MINES AND TORPEDOES.

Torpedoes and submarine mines have come to be important factors in harbor defences.

There is a torpedo school at Willets Point, New York Harbor, under the management of the Engineer Corps of the Army. Here an admirable system of submarine mines and torpedo defence has been perfected, which is fully abreast with modern science.

The general term *torpedo* is used in a military sense to designate all contrivances for producing explosions calculated to act destructively against an enemy coming into their immediate vicinity. They are used as auxiliaries to land batter-

ies for obstructing rivers and entrances to harbors, and are either stationary or capable of movement. When stationary they are called *submarine mines*, leaving the term *torpedo* for movable combinations of this nature.

SUBMARINE MINES.

Submarine mines may be classed under two heads, viz., *mechanical*, those which depend for their explosion upon mechanical means, such as the percussion of a vessel coming in contact with them; and *electrical*, those which are fired by electrical agencies either by the vessel closing the circuit, or at will, from the shore. The former class have only a limited use as, when in place, they make the channel equally impassable to friend and foe, but they have the advantage of being simple in construction so that they may be handled and planted by ordinary workmen.

The second class are under perfect control and may be rendered harmless at any time, by cutting out the battery, but they require a certain amount of technical knowledge for their manipulation.

They are *buoyant* or *ground mines*, depending upon whether they are anchored from or rest upon the bottom. When the water is shallow, ground mines are used, but for depths beyond forty feet the buoyant mines would be necessary.

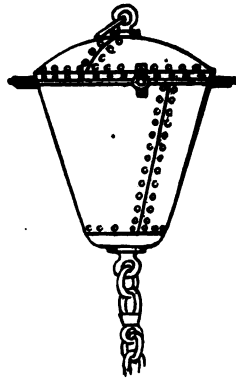


Fig. 24.



Fig. 25.

Fig. 24 illustrates a buoyant mine and Fig. 25 a ground mine in place under water. The cases are usually made of metal; they must be water tight and are cylindrical, conical or spherical in shape.

The explosives used are gunpowder, dynamite and gun cotton, dynamite being the one now most extensively used. The charges range from 100 to 500 pounds.

A single torpedo with 200 pounds of dynamite, if favorably applied, will smash the armored ribs of the greatest war ship in the world, and the mere suspicion of submarine mines makes a hostile fleet timid, if not sufficient to prevent war ships from attempting to enter a harbor till it has been explored and cleared of these hidden obstacles. The same as with land mines, the moral effect constitutes their greatest efficiency. Our system of sub-marine mines probably does not differ essentially from the German, French, English or Russian. The construction of the firing box, however, and the circuit-closer in the mines are kept *confidential*, to be known to only one or two except commissioned officers. These secrets, however, are of a technical nature and do not prevent becoming familiar with the general methods. So the history of the torpedo or mine may be followed from its beginning in the steel shop, through its loading, laying, grouping and testing, till it finally discharges and does its work—all this without violating any official secret.

One secret is, however, guarded with zealous care and is known only to a few engineers of the highest rank and the high officials of the War Department. This is the *hydrographic survey* of our *harbors*, with the plotting of the torpedo fields as they would be laid in preparation for active war. A plan has been carefully worked out for each important harbor in the country.

The problem involved in arranging any system of mines, for the defence of a channel, contains so many conditions that it is impossible to give more than a general suggestion concerning its solution. As far as practicable no indication of the position of a mine should appear on the surface of the water and yet the spot to within a few feet of where it is deposited must be known to the defenders of the channel. Mines are located by instruments on shore. They must be so placed that a vessel passing along the channel will at some moment, whatever course she may take, come within the radius of destructive effects of one of the mines. This is generally attained by placing the mines in several rows

across the channel, the mines of each row being opposite the intervals of the others, something as shown in Fig. 26. The rows of the mines are from one

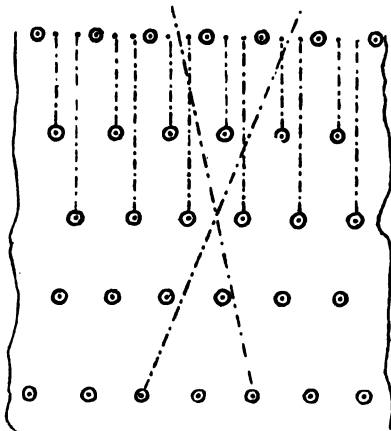


Fig 26.

hundred to two hundred yards apart, depending upon the size and nature of the explosive charge. Buoyant mines should be moored so as to float from ten to forty feet below the surface, depending upon the depth of the channel and the size of the boats likely to pass.

Mechanical mines are fired by means of percussion nipples or caps which explode upon contact with a vessel. Electrical mines are fired by means of an electrical fuse, which is connected with a galvanic battery, electrical cables being used to connect with the operating casemate of the fort.

TORPEDOES.

As previously stated, the term *torpedo* has a general meaning embracing sub-marine mines, together with all machines for destroying ships by blowing them up, but in its restricted, *technical* sense it is applied to missiles fired under water, either from shore or from boats.

There are two classes, *controllable* and *uncontrollable* or *fish* torpedoes.

The first class, of which the Patrick torpedo, Figure 27, is a representative, carry within themselves engines that supply their motive power and are steered from shore by means of either one or two electric cables.



Fig. 27.

The engines may be driven by compressed air, carbonic acid gas, or electricity supplied from shore along the cable.

There are several kinds but they are similar in construction. They are all cigar shaped and in moving are kept a few feet under water by means of a buoy or float, to which they are firmly attached and which is similar in shape to the torpedo, but a few feet longer. These torpedoes are about two feet in diameter, vary in length from 20 to 35 feet and carry from 100 to 500 pounds of dynamite or gun-cotton, as an explosive charge. Two flags or metallic balls are attached to the buoy so that its direction can be followed by the operator on shore. Their range is limited by the length of cable that can be carried, and means for observation. Two miles is their extreme range.

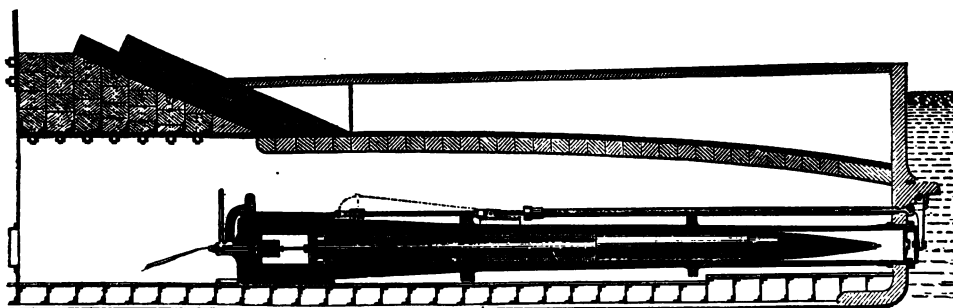


Fig. 28.

Figure 28 illustrates the second class or *projectile torpedo* as it is fired from a tube built in a vessel. The shell of the torpedo is usually brass and

most of the other parts steel. Nearly all recently constructed warships are equipped with torpedo tubes. Their range is less than $\frac{1}{2}$ mile.

ELECTRICITY APPLIED TO WARFARE.

Mechanical and electrical engineers are to find extensive fields for the application of their knowledge in modern warfare.

Besides the electric telegraph and telephone service conducted by the Signal Department, and the electrical appliances for firing large guns, sub-marine mines and torpedoes, the employment of the *electric light* has a growing prominence in warfare. This is not, however, an entirely new idea. It was used in the Crimean War, 1855, to light up the point of attack, and in the Siege of Paris, 1870-71, the electric search-light was used by both sides with much effect. But it is within the past few years that especial attention has been given to that portion of warfare which may be said to *begin* at night.

The principal uses to which electric lights are now put for war purposes may be classified under the following heads :

1. First-Class Lights for Fortresses, Coast Defenses, War Vessels and Sub-marine Mining Operations.
2. Semi-Portable Lights for Embarkation, etc.
3. Portable Lights for Field Operations.
4. Portable Lights for Land Mining Operations.
5. Signaling by Electric Light.

To deal with all these subdivisions of the subject in detail in the course of a short lecture upon this class of subjects would be too comprehensive an undertaking. It is only proposed to outline them in a suggestive way to those who are interested to pursue them.

The question of first-class lights for fortresses is receiving much attention the world over, and their introduction into naval vessels is an accomplished fact. For submarine mine fields, they have long been used. For night embarkations of troops and stores on board ship or into trains, the ordinary commercial arc-lamp and portable engines fulfill the purpose, without re-

quiring any special adaptation as war measures. The use of portable electric lights for field operations is now receiving attention and development. We may take for granted that a besieging army will find any permanent fortress against which it may be engaged, equipped with electric lights with which to search out the night operations conducted against it, so that the seige of a fortified place will no longer be the comparatively simple operation of constructing works at night and firing from them during the day. This disadvantage on the part of the attack is to be counteracted by the employment by them, of electric search lights.

It has been shown that when the atmosphere is at all heavily laden with smoke or with mist, the penetrating power of the light of a fortress can be diminished by the employment on the part of the attack of another beam crossing the former at an angle. Therefore the electric lights will produce cover behind which, parallels or seige batteries can be commenced by the attacking force in spite of the search lights operated by the defenders of the fortress.

The appliances for these field lights must be portable, so that they can be transported with armies, after the manner of seige and pontoon trains.

The things required to produce a search light are :

1. A boiler.
2. A steam engine.
3. A dynamo.
4. A lamp.
5. A protector with condensing mirror.
6. Certain small accessories.

Foreign armies, especially the French, German and Italian, already have these equipments in portable forms, mounted on carriages and also equipments for pack-saddle transportation in mountainous countries. The Russians and English have not made so much progress but are experimenting upon systems for carrying search lights in the field.

The subject of night signals by electric lights both by arc lights and by incandescent lamps is also receiving attention, but is at present in an experi-

mental stage, and is a subject interesting not only to the specialists of the Signal Corps, but to the army at large.

ORDNANCE DEPARTMENT.

This department conducts the manufacture and supply of arms, ammunition and accoutrements for the infantry; guns, carriages, harnesses, ammunition and equipments for the artillery and cavalry, including all such utensils as knapsacks, haversacks, canteens, tin cups, meat ration cans, spoons, knives and forks.

The chief of ordnance ranks as a brigadier general, and is stationed at Washington, D. C. The other officers consist of three colonels, four lieutenant colonels, ten majors, twenty-four captains, and twelve first lieutenants who are stationed at the various arsenals and ordnance depots throughout the country. Besides these commissioned officers the department contains sergeants, corporals and first and second class privates. These are largely skilled men employed about the arsenals and depots.

SMALL ARMS.

The term *small arms* is applied to those weapons which are discharged from the hand, in contradistinction to *cannon*, which is applied to heavy fire-arms discharged from carriages.

Small arms are spoken of as *hand arms* and *projectile arms*.

The hand arms down through the different ages, have comprised the war club, battle axe, pikes, swords and sabres. The pike, in the form of a bayonet on the infantry rifle, the sword and sabre are all that are now in use in our army, though in nearly all foreign armies the lance is used by a portion of the cavalry.

PROJECTILE ARMS.

The early projectile arms were the sling, bow and cross bow, but since the invention of gunpowder about the middle of the fourteenth century, portable *fire-arms* of some form have been in the hands of troops.

Figure 30 illustrates the first rude hand gun, consisting simply of a tube of iron or copper, fixed in a straight stock of wood, touched off with a match.

These guns weighed from 25 to 75 pounds each and the larger ones were worked by two soldiers, one resting the muzzle on his shoulder and the other applying the match to the vent.



Fig. 30.

A *forked rest* was also used for the muzzle, so that one man could manipulate the weapon. The match was first applied at a vent on top, and the first step at improvement was to place the vent on the side with a pan to hold the priming. This led to the gun known in 1517 as the *matchlock*. Later came the *wheellock* and in 1630 the *flintlock*.

The English flintlock, "Brown Bess," figured in the early Indian wars and the Revolution in this country, in the Napoleonic wars, and down to 1830.

The *percussion cap* came into use in 1840 and was in use during the Mexican war. Rifled fire-arms came into use between 1850 and 1860 and were used in the war of the Rebellion. Breech-loading guns were used to a limited extent in this war, but the Franco-German war of 1870-71 was the first war really fought with breech loaders. The single loader is now rapidly giving way to the repeating or *magazine gun*.

CANNON.

The early cannon were cylinders, constructed by binding together bars of iron with hoops after the manner of a barrel, which were terminated at the bottom by smaller cylindrical chambers for the powder. See Figure 31. The projectiles were stone balls principally employed to breach stone walls.

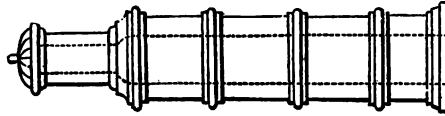


Fig. 31.

Bronze soon came into use in gun making, and was continued for field artillery even through our war of secession, but the stone balls were early superseded by spherical iron projectiles.

Nearly all modern cannon are of built-up steel, they are rifled, load at the breech and fire oblong steel projectiles.

PROJECTILES.

Until 1860 all cannon were smooth bore, firing spherical balls, and until quite recently they were also muzzle loaders. Muzzle loading and smooth bore cannon have now become obsolete, as effective weapons, consequently spherical projectiles will not be here considered in detail, as they cannot be used in rifled guns. The grape and canister heretofore used in smooth bore cannons, for repelling an assault, will probably in the next war be superseded by showers of bullets from machine guns. These machine guns have oscillating movements which make their fire more destructive than grape and canister and a terror to assailants in an open field.

Projectiles may be classed either as *shot* or *shells*; they are made of chilled iron, cast steel, chilled steel, and hammered and tempered steel. Steel projectiles are very expensive but have proved superior to all others, against armor plates which are coming into use for land defences, as well as to cover navy vessels. Modern cannon projectiles are oblong and from $2\frac{1}{2}$ to $3\frac{1}{2}$ calibres in length, and receive a rotary motion about their longer axis, from the rifling of the gun.

Spherical shot and shell will of course continue in use with smooth bore guns, which must constitute the armament until the new model guns can be supplied.

SHOT.

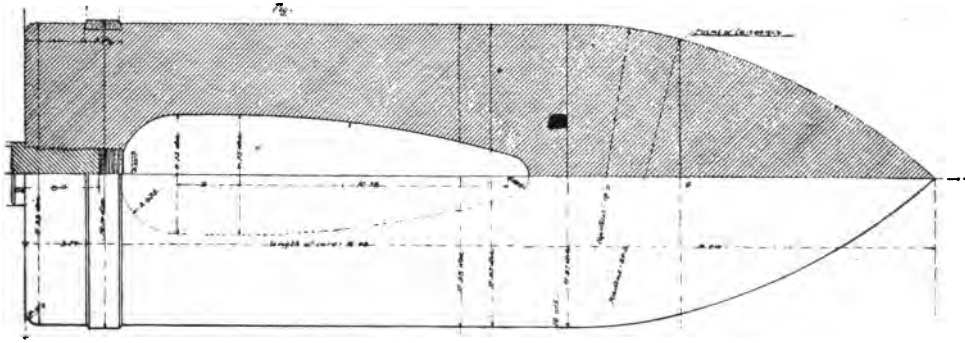


Fig. 32.

These are either solid, or *core shot*, for battering and piercing armor. Figure 32 illustrates the core shot for the 12-inch rifle. It has a small cavity near the rear end of the projectile which serves to throw the centre of gravity well to the front, the aperture being closed with the screw plug as seen in the cut.

SHELLS.

These are of the same general form and shape as the shot, but made hollow and filled with a bursting charge, so that the fragments will do execution. They are also made with thinner walls and filled with bullets, incendiary fire, etc., to be scattered by a bursting charge. In the latter case they are called Shrapnel: see Fig. 33.

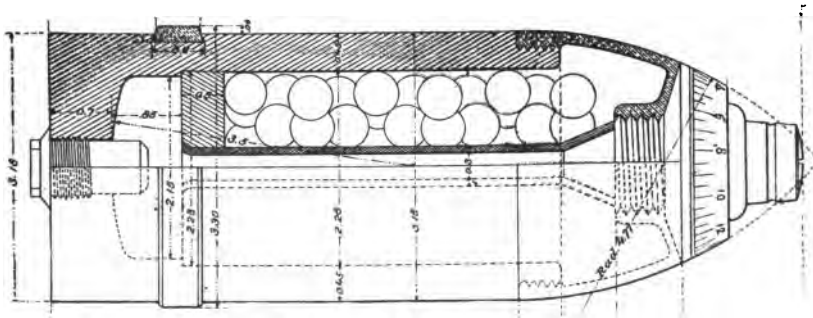


Fig. 33.

Canister shells have an envelope only strong enough to hold the small bullets together during the operations of loading and while in the bore of the gun allowing them to scatter as soon as they leave the muzzle. See Fig. 34.

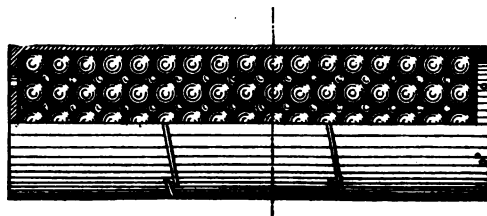


Fig. 34.

Both shot and shells are caused to take the grooves of the cannon by having a rim of softer metal somewhere near the base, of a slightly greater diameter than that across the lands of the rifling of the cannon. A shell is burst by means of a fuse, shown at the head of the shell illustrated in Fig. 33. There are various kinds of both time fuses and impact fuses, so that a shell may be made to burst at any time during its flight or upon impact at its destination. There is also a combination fuse which gives a double chance in bursting the shell.

REVOLVING OR RAPID-FIRE GUNS.

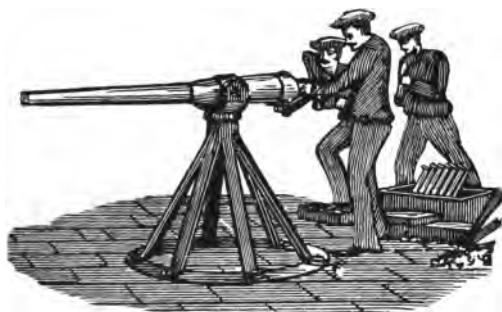


Fig. 35.

There are several varieties of this class, such as the Driggs-Schroeder, Hotchkiss, Nordenfeldt, etc. They are larger than the class known as machine guns and use steel projectiles, the largest of which weigh from two to four pounds, and are thrown at the rate of sixty per minute. Their use is especially adapted

to modern vessels of war, against torpedo boats and for sweeping the decks of an enemy's ship. Fig. 35 illustrates the Driggs-Schroeder Rapid-Fire gun.

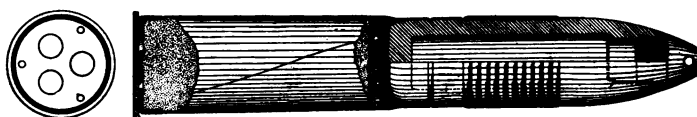


Fig. 36.

The larger models of these guns are coming into use on field artillery carriages. They differ, however, from the ordinary field gun in that the ammunition is "fixed," that is, the charge and projectile are secured in a metal case, something like small arm ammunition. See Fig. 36. They are automatic only in the ejection of the empty cartridge-case and the cocking of the piece by the opening of the breech after firing. A complete round of ammunition for these guns should not exceed a weight that can be handled by one man. The 6 pounders can be fired with fair aim as fast as fifteen shots per minute.

EXPLOSIVES.

Explosives contain carbon, oxygen and nitrogen. *Explosion* consists in disturbing the equilibrium of these ingredients, usually by heat, and converting them instantaneously into gas; the carbon and oxygen uniting to form carbonic acid gas and nitrogen being set free.

Explosives are divided into two classes: (1) *Mechanical Mixtures*, e. g., Gun-powder, the explosion of which is by combustion of the individual grains, progressively, and (2) *Chemical Compounds* to which class all the *High Explosives* belong. In these the elements being in chemical combination, can only be separated by chemical change, consequently their explosion is not by progressive combustion but by all the parts decomposing simultaneously, causing the initial pressure to be a maximum one.

GUNPOWDER.

Gunpowder was discovered accidentally by a German, Berthold Schwartz, about the middle of the 14th century. He appears to have been engaged in

experiments with sulphur, charcoal and salt-petre, and left the mixture in an apothecary's mortar covered with a large stone. It accidentally caught fire and exploded, throwing the stone to a great distance. This suggested the idea of using a mixture of these three ingredients as a projectile force and led to the production of gunpowder. The proportions of the ingredients used for black powder have usually been

Saltpetre....	76 per cent.
Charcoal.....	14 “ “
Sulphur.....	10 “ “
	<hr/> 100

Gunpowder explodes at 572° F. and great care must be used in handling, storing and transporting it. Wooden barrels are used and implements of wood or copper. Guns, swords or any implements of steel or iron that might occasion sparks must not be carried to a magazine or where there is loose powder. Men must take off their shoes or wear socks and when powder barrels are to be rolled cloth or carpet should be spread.

HIGH EXPLOSIVES.

These owe their explosive force to the action of nitric acid upon cellulose, wood-fibre, glycerine, etc. Each is formed by introducing into a body composed of oxygen, carbon and hydrogen, nitrogen in feeble combination with oxygen, in place of part of the hydrogen. The nitrogen holds the oxygen so feebly that a slight disturbance of the equilibrium brings into action the stronger attractions of the carbon and hydrogen for oxygen.

The number of high explosives is very large, but as distinctive types in actual use we need perhaps only mention the following: Gun-cotton, Nitro-glycerine, Dynamite No. 1 and Blasting gelatine.

The following is the table of their specific pressures, compared with gunpowder, as given by Commander Barber :

Gunpowder	1
Dynamite No. 1	13
Gun-Cotton	14
Nitro-glycerine	16
Blasting Gelatine	17

GUN-COTTON.

This is merely clean cotton subjected to a mixture of nitric and sulphuric acid. The sulphuric acid acts simply in taking up the water and preventing the nitric acid from destroying the fibre of the cotton and does not enter into the compound. Gun-cotton explodes at 360° F.

NITRO-GLYCERINE.

This was first called blasting oil. It is an oily and almost colorless liquid, (though slightly yellow) of a sweet taste, formed by the action of a mixture of nitric and sulphuric acid upon glycerine at a low temperature. As in the case of gun-cotton, the sulphuric acid does not enter into combination. Nitro-glycerine explodes at 365° F., is not affected by water and freezes at 40° F. It is comparatively safe when frozen.

It was found that liquid explosives like nitro-glycerine unless frozen were too dangerous to manipulate and store. This led to the invention of dynamite, which is simply nitro-glycerine mixed with some absorbent, thereby making it a solid body.

DYNAMITE.

Dynamites are divided into two classes.

1. In the first class the absorbent of the nitro-glycerine is inactive, e. g. *Dynamite No. 1*, which consists of 75 per cent. clear nitro-glycerine and 25 per cent. infusorial earth. This dynamite is a loose, soft, readily moulded substance, of buff color. It freezes at 40° F.

2. In the second class of dynamites the absorbent is itself an explosive substance such as the nitrates of potassium and sodium, resin, wood fibre, etc. Of this class the most powerful is

BLASTING GELATINE.

This is formed of 92 parts nitro-glycerine and 8 parts collodion gun-cotton. It becomes a solid, is an elastic, pale yellow substance, can be cut with a knife and formed into any shape. It is not affected by water and does not require any particular care in handling or transporting.

Nearly all of the high explosives if in small quantities, and not constrained, burn slowly without explosion. It seems to require a quick impulse to upset the equilibrium of the atoms, and to obtain the fullest effects detonating caps or nipples are necessary—those composed of fulminate of mercury being the best.

FULMINATE OF MERCURY.

This is the agent employed for igniting other substances and is used mainly in percussion caps, nipples, primers, fuses, etc. It is formed by the action of mercury, nitric acid, and alcohol. When dry a violent explosion is caused by a blow, by a spark or by 366° F. of heat.

SMOKELESS POWDER.

For nearly five hundred years, and until quite recently, black powder has held its own against every other explosive for war purposes. And while it cannot be said that high explosives have now regularly entered into warfare, yet smokeless powders have come to be recognized the world over, as factors which must upset pre-conceived theories and revolutionize old methods. General Wolseley of the British Army recently said, "To excel, the general must be ahead of his adversary in tactical knowledge and in his application of modern inventions. He must train his army and prepare it tactically for a warfare to be waged with high explosives, magazine arms, balloons, the electric light and cycles."

All European nations have now a so-called smokeless powder in use, with small arms and rapid fire guns, though for heavy ordnance it is yet in an experimental stage. Many of the foreign smokeless powders are carefully guarded secrets, and the proportions of their ingredients cannot be accurately determined,

yet it is generally understood that nitrated-cotton is the basis of nearly all of them. Some contain 94 per cent. gun cotton, 5 per cent. nitro-glycerine and 1 per cent. castor oil.

As nearly all the *new powder* is converted into gas, only about one half by weight of the former charge of *black powder* is now used in a cartridge, and this amount gives a vastly augmented chamber pressure and increase in velocity, and enables the reduction in calibre of small arms from .45 to .30. In the new cartridge only 32 grains of the new powder are used, against 70 grains of black powder in the old cartridge, with a bullet weighing but 220 grains against the 500 grain bullet of the old cartridge.

This reduces the entire weight of a cartridge about one half, and enables the soldier to carry twice as many as formerly. "Smokeless powder" is simply one which produces a very light cloud, not of smoke, but of bluish vapor which disappears almost immediately and is not sufficient to obstruct the vision in aiming.

The difficulties in the production of smokeless powders are the apparent impossibility of insuring the explosion being controllable and uniform, and the uncertainty as to how far storage will affect these indispensable qualities. It is quite certain that smokeless powder cannot entirely supersede gunpowder, until it has gone through the practical test of storage, in varying and extreme climates, for a long series of years. The best authorities state that smokeless powders, as a general rule, are not affected by moisture, but that they are to a greater or less extent influenced by heat.

In few paths of science has progress been more marked than in the development of materials of war. Half a century ago, the heaviest guns weighed only about five tons and fired with a charge of 20 pounds of powder, a spherical projectile weighing only about 70 pounds, to which was given a velocity of about 1500 feet per second, a ballistic effect equal to an energy of 1060 foot-tons.

The heaviest guns of the present day fire a projectile weighing 1800 pounds with a charge of 850 pounds of powder and a velocity of 2100 feet per second equivalent to an energy of 55,000 foot-tons.

The question now arises how far our present guns are suited to the new smokeless powders, and to what extent they must be changed in order to reap the full advantage of these new powders.

The results recently obtained from smokeless powder in France and Germany point to still farther revision of the system of gun construction.

SIGNAL CORPS.

This corps comprises besides the chief signal officer at Washington, D. C., who ranks as brigadier-general, one major, four captains, four first lieutenants and fifty sergeants. The officers of this corps have charge of the construction, maintaining and operating military telegraph and telephone lines, and the procurement, preservation and distribution of such supplies as are required in the signal service of the Army.

In time of peace, military telegraph and telephone lines are maintained, in the Western frontier country, connecting the military posts with the nearest commercial lines, and the signal sergeants are detailed as operators.

At the various military posts "line officers" are detailed as acting signal officers, who have charge of the signal equipments and instruction pertaining to the post. All officers and a portion of the men of each company, troop or battery, are required to be proficient in the exchange of the day and night signals by flag, torch and other devices, so that communication can be kept up between parties on shore and water. The equipments are all packed together, constituting one kit, to be carried by a soldier either mounted or on foot.

Previous to receiving instruction in the use of the flag and torch, men should be instructed in the infantry drill regulations, to include the school of the soldier and company.

The drill for field telegraph trains may be found in the "Manual for Signals" issued by the Chief Signal officer of the Army.

SIGNAL CODE.

The Morse telegraph code, *heretofore given, has since October 1, 1896, been replaced by the Myer code formerly used, which is as follows:

A,.....	22	O,.....	21
B,	2112	P,.....	1212
C,.....	121	Q,.. ..	1211
D,.....	222	R,.....	211
E,.....	12	S,	212
F,.....	2221	T,.....	2
G,.....	2211	U,.....	112
H,.....	122	V,.....	1222
I,.....	1	W,.....	1121
J,.....	1122	X,.....	2122
K,.....	2121	Y,.....	111
L,.....	221	Z,.....	2222
M,.....	1221	&,... ..	1111
N,.....	11	ing,.....	2212
		tion,.....	1112

3—End of a word.

33—End of a sentence.

333—End of a message.

22.22.22.3—Signal of assent: “I understand,” or “message is received and understood,” or “I see your signals,” or affirmative generally.

22.22.22.333—Cease signalling.

121.121.121.3—Repeat.

21.21.21.3—Error.

211.211.211.3—Move a little to the right.

221.221.221.3—Move a little to the left.

Flag waved successively from side to side until attention is attracted—“Attention, look for signals from this point.”

*Lecture No. 2, page 37.

NUMERAIS.

1. 21112—Wait a moment.
2. 12221—Are you ready ?
3. 22122—I am ready.
4. 22212—Use short pole and small flag.
5. 22221—Use long pole and large flag.
6. 12222—Work faster.
7. 11222—Did you understand ?
8. 11112—Use white flag.
9. 11211—Use black flag.
0. 22222—Use red flag.

When the numerals are used in transmitting messages as code signals, they have the meanings given above, opposite each character.

a—after.	b—before.	c—can.	h—have.
n—not.	r—are.	t—the.	u—you.
ur—your.	w---word.	wi—with.	y—why.

The first position is with the flag held directly above the head of the flagman.

To make the first motion, or “one” or “1,” the flag, being at the first position, is waved to the ground to the right, and instantly returned to the first position.

To make the second motion, or “two” or “2,” the flag, being at the first position, is waved to the ground to the left, and instantly returned to the first position.

To make the third motion, or “three” or “3,” the flag, being at the first position, is waved to the ground directly in front of the flagman, and instantly returned to the first position.

TO SEND A MESSAGE.

First call “attention” by waving the flag successively from side to side, until it is seen and answered by the opposite station. The station called will “answer”

by making 22. 22. 22. 3, the general signal for assent or affirmation, to signify that it is ready to receive the message. The communicating station then makes 22. 22. 22. 3, signifying, "I see you are ready to receive the message," and then proceeds to transmit the message, letter by letter. A pause is made at the end of each letter. At the end of each word, the flag is waved to the ground, directly in front ("3,") to show that the word is finished. At the end of each sentence, there is a pause, and the flag is waved to the ground twice, directly in front ("33,") to show that the sentence is finished. At the end of a message, the flag is waved to the ground three times, directly in front ("333,") showing that the message is finished.

When the signal "333," "end of message," is made, it indicates, "My communication is complete; I await your answer." The station receiving the message will, upon noticing the signal "message complete," if the message has been correctly received, immediately answer with the signal of assent, "22.22.22.3;" and will then, if the sending station has finished, signal in turn such messages as it may have to communicate. If, however, the message, or any part of it has not been correctly received, or is not understood, the receiving station will make the signal for "Repeat," "121.121.121.3," followed by the part of the message to be repeated, as "121.121.121.3 after or before the word--(here signal the word after or before which the repeat is required)." If the message is not understood at all, the signal "121.121.121.3—all" is made. In commencing a repetition, the sending station will always commence by making the "signal of assent," to show that the call for "repeat" is understood.

This "signal of assent," meaning "I understand," will be used habitually at the commencement of all communications.

When, in the transmission of a message, a mistake is made, as may happen by the error of the signalist or of the flagman, the "error signal" "212121.3" is made. The sender then, beginning with the letter in which has been the error, signals it correctly, and proceeds with the message.

In telegraphing with the Myer code, the signal-numerals thereof are transmitted by blows of the key, like the dots of the Morse alphabet, one blow indicating

the numeral 1, and a double blow (two blows made without interval) the numeral 2. It is received by sound, the stroke of the armature of the magnet making the sound. Three blows or strokes, without interval, is full stop, and is the only punctuation mark used.

PIGEONS AS MESSAGE CARRIERS.

The love of home and the habit of returning there when set free in a strange land is a characteristic feature of many birds and animals. The acute horseman first goes to look for his stray horse where the animal was raised or previously kept and dogs are much used for carrying messages home to their owners. But this quality in the pigeon has become the most useful to man, because the most susceptible to his control.

These birds are generally known as "Carrier Pigeons," though in the different countries they pass under various conventional names; for instance in England and America they are called "Homing Pigeons," in France "Voyageurs," and in Germany "Brieftauben."

The most extensive use of the pigeon for war purposes was probably during the Franco-German war of 1870 and 1871, when the balloon and pigeon services were combined to open communication with the French who were besieged in Paris.

The birds were carried into Paris in balloons over the heads of the German besiegers and when let loose returned to their homes over a distance of 150 miles. The messages were attached to the tail feathers in such a manner as not to be readily observed unless the birds were caught and carefully examined. These messages were reduced by photography so that long dispatches could be placed in a single quill, without offering impediment to the bird's flight. The French Army has now a regularly organized "carrier-pigeon corps."

The military lofts of Germany are very complete and the government encourages pigeon flying as a national sport. In Belgium this is a national pastime to such an extent that nearly one-fifth of the people are pigeon-fanciers, and "pigeon lofts" are characteristic features of the dwellings. Millions of these

birds have been carried from Belgium into France in a single year to be liberated, and in returning they have flown 215 miles at a rate of speed exceeding one mile per minute, for the whole distance.

During the past twenty years considerable has been done in this country in an experimental and sporting way in pigeon flying. Gentlemen take birds from their home lofts in the city, to their suburban residences to use in returning messages.

The birds are susceptible of education and the impulse and ability to return home over long distances is attributed to a certain degree and kind of intelligence and not alone to instinct or intuition.

Pigeons whose homes were in Hoboken, N. J., are reported to have returned within a little over eight hours after being liberated at Steubenville, Ohio, a distance of 340 miles, and a flight has been made from Montgomery, Ill., to Fall River, Mass., some more than 1,000 miles in twenty hours. The attachment of the pigeon seems to be for his home and loft, rather than for mate or young. There are many theories advanced by scientists in explanation, but those who have given the subject the most study say that it is due to keen sight and wonderful memory, directed by intelligence, that the pigeon is able to answer to its ruling impulse, and return to its loft over long distances.

They not only err, but show indecision when liberated in a strange place, and many fail to accomplish their journeys. They fly about for a while and if not able to take the direction, return to the place where they were liberated. After a time they start again and take wider circles, until all at once they seem to discover the direction, and then take a straight course towards their homes.

MILITARY BALLOONING.

France has a Balloon Corps in her army, and England has within the past two years formed a "balloon depot" and "balloon section," the former consisting of one instructor in ballooning, a mechanist, a clerk and six other grades, and the latter a captain, 2 lieutenants, 1 Co. sergeant major, 1 sergeant and 23 other ranks. The section is accompanied by a train of wagons for carrying balloons,

anchor-wire, gas tubes and other apparatus. Germany, Russia, Italy and the less important military nations are supplied with aeronautical apparatus, schools of practice, etc., and many have plants and experiment stations, where work is conducted more or less secretly upon power-driven air ships.

Our government has so far done little to develop ballooning, though private enterprise in this country keeps up experimenting, and in the event of a war, we should undoubtedly call these valuable aids into use under the management of the "Signal Corps" of the Army to which they would naturally pertain.

Some prophesy the use of balloons in the hands of skillful navigators for sailing over the enemy, to drop among them inflammable compounds and destructive explosives, deadlier in their results than dynamite and other substances that can be thrown from a cannon.

But the most reliable aeronautic service will probably be in the use of "captive balloons" for reconnoissance and observation within our own lines, or as near the enemies' lines as it is practicable to go, the great use in the field being to supply information as to the disposition of the enemy's forces before the engagement commences and giving details as to the position of his camps and his works, and during the fight in observing the effect of artillery fire so that it may be corrected, and the general progress of the battle. It is even likely that commanders will issue their orders in many cases from balloons, when they themselves can observe large areas and telephone instructions to their staff officers on the ground.

Although expensive, hydrogen seems to be the best gas for military purposes, its lifting power being from 60 to 68 lbs. per 1000 cubic feet.

The capacity of the war balloons is from 10,000 to 19,000 cubic feet, so that besides the wire rope necessary to anchor them to the ground and the necessary appliances, a balloon will carry two or three light men in the air at a height of 500 yards. The rope or cable answers the purpose both of a guy and means of communication with the ground.

It is made of several strands of wire inclosing in the center an insulated wire for telephonic use. The rope used may be less than one inch in circum-

ference, weighing only about one ounce per foot, and still have a breaking strain of one ton. Messages are sent by means of a bag and sliding ring on the wire as well as by telephone. The English supply the gas ready made from tubes carried in wagons. Other nations carry the plant and material for making the hydrogen in the wagons.

POST CHAPLAINS.

This corps contains 30 officers and in addition to these, which are officially designated "Post Chaplains," the four colored regiments of the Regular Army have each a regimental chaplain. All of these chaplains rank as captains of infantry.

They are appointed by the President from civil life and must be regularly ordained ministers of the gospel. In addition to their religious duties at military posts, where they are stationed, they usually superintend post schools which are provided for the children of officers and soldiers, as well as for enlisted men. There not being as many chaplains as there are military posts, they are usually assigned to the larger ones and those located where there is the best field for their labors. In time of war each regiment has a chaplain, and the regimental organization of "volunteers" and "militia" usually contains a chaplain in its list of staff officers.

RETIRED OFFICERS AND ENLISTED MEN.

Officers are retired upon three-fourths pay of their grade, at sixty-four years of age or upon becoming disabled in line of duty, and after thirty years' service they may be retired upon their own application, at the President's discretion. Upon retirement officers are withdrawn from command and from line of promotion. They are, however, entitled to wear the uniform of the rank upon which they were retired, continue to be borne on the army register and subject to rules and articles of war and to trial by general court-martial for any breach thereof. They are not assignable to active duty except at certain places, the Soldiers' Home, colleges, etc., and are at liberty to reside at such places as they wish and if they so desire engage in business or receive appointment to civil office.

Enlisted men who have served as such thirty years, either in the Army, or the Marine Corps and the Army, may upon their application be placed upon the retired list, and receive three-fourths of the pay and allowances of the grade held when retired.

THE UNITED STATES MILITARY ACADEMY.

All the principal nations of the earth consider it necessary to support national military schools for supplying educated officers for their armies. While most of the principal nations have several, we have but one military school especially devoted to supplying educated officers for our army. This is located at West Point, New York, on the Hudson river, about 50 miles north of New York City.

This historic spot was selected for the purpose by Washington before his death, and in 1802 the Military Academy of the United States was established there by an act of Congress. The institution is supported by an annual appropriation by Congress. It is not sustained as a charitable institution, but rather as an educational investment from which the government expects large returns in case of war, and from which, in times of peace, military training may revert to other institutions of learning and to the militia, through graduates from the Military Academy being assigned as instructors. It is generally conceded to be one of the best military schools in the world, and for an all-round military education it is by many pronounced the best. The schools of Europe are usually confined to specialties, while all officers are educated at West Point for all branches of the service alike. They are thus broadly equipped for occupying high commands, embracing all "arms" and corps.

There are seven permanent professors authorized by law, having the rank and pay of lieutenant colonel during their first ten years' service and afterwards the rank and pay of colonel. The other officers are assigned by the President, from the army, and changed once in about four years. The chief officer of the institution is styled *Superintendent* and while so serving is the head of the Academic Staff. The next in authority is the *Commandant of Cadets*. The cadets

are appointed by the Secretary of War upon the recommendation of the Members of Congress from the districts in which they reside. Each Congressional district and Territory, and the District of Columbia, is allowed one cadet and the President is also authorized to make ten appointments at large, so that the number of cadets is now limited to 347.

The cadets constitute a part of the army, and take precedence over all non-commissioned officers, ranking next below second lieutenant. The pay of a cadet is \$540 per annum, from which he purchases his books, clothing, board, etc., receiving only tuition, quarters and medical attendance without charge.

The age for the admission of cadets to the academy is between seventeen and twenty-two years. Candidates must be unmarried, at least five feet in height, free from any infectious or immoral disorder, and generally from any deformity, disease or infirmity which may render them unfit for military service. Congressmen usually select their appointees by competitive examinations in their respective districts, and candidates are also subjected to rigid physical and mental examinations upon entering the academy.

The course of study extends through four years, and comprises pure and applied mathematics, English, French, Spanish, drawing and water color painting, philosophy (including mechanics, acoustics and optics), astronomy, chemistry and electricity, mineralogy and geology, military and civil engineering, ordnance and gunnery, science and art of war, constitutional, international and military law, and the drill regulations for all arms of the service. The institution may be considered as noted for its thoroughness of instruction and for its systematic discipline, both physical and mental. The general *practice on the continent of Europe is for the professor to deliver lectures to classes, often numbering 100 or more, after which the students are questioned by interrogatories once or twice a week, perhaps not oftener than once in two weeks or frequently not until the end of a term. At West Point, on the contrary, classes are divided into sections of ten to twelve cadets, and these sections, under the supervision of a professor, are each in charge of an instructor who devotes an hour or an hour and one

*Upton's Armies of Europe and Asia.

half to its recitations daily, Sundays only excepted. By this division into sections, which is the secret of the thorough mental training at West Point, the cadet recites from four to six times a week, while the foreign cadet may escape weeks at a time.

Studies commence the first of September and continue uninterruptedly until about the middle of June. Semi-annual examinations are held in January and June, when those cadets who have not attained a certain standard of proficiency are dismissed. The standard of examinations is so high, that from 30 to 50 per cent. of those who enter fail to graduate, while in foreign schools not more than three or four per cent. fail.

The institution is not only under the close supervision of the War Department but is closely inspected each year by a board of visitors who remain through nearly two weeks of the examinations. This Board is made up of seven prominent men of the country appointed by the President, and of two Senators and three Members of Congress, and detailed reports are rendered to the President and to Congress concerning the discipline and instruction at the academy, to which are added recommendations for the future.

It is claimed that the cadets perform before this board of visitors each year a variety of military maneuvers in engineering and all arms of the service which is nowhere approached or even attempted in Europe. The cadet's uniform is gray. The cadets live in barracks from September to June and during the summer in camp, and for purposes of military discipline are organized into a battalion of four companies. They are marched to meals and to recitations and their rooms are subject to frequent inspection during both day and night. Two cadets room together; their rooms are furnished in a uniform manner and in soldier-like simplicity. It is a most democratic institution where the sons of the poor and the rich must live alike in all respects. No cadet is allowed to keep a horse, dog or servant or have money in his possession, all accounts being kept for him by the treasurer. His food, his exercise, his time for study and sleep are arranged upon a systematic basis from which he cannot depart. He is confined to the limits of a small reservation, and has but one furlough during his four years' course, which lasts for about two months at the end

of his second year. The cadets are, however, in camp and released from study during the two months of summer. Their friends then visit them, they are allowed semi-weekly hops and it becomes a season of gaiety and enjoyment. The life is not considered severe for those who are susceptible to discipline and cut out for the life of a soldier, still it is competitive throughout, and may be considered as a process of selecting the "fittest" for the profession of arms. Only about 33 per cent. of those who receive appointments graduate, the other two-thirds, either fail to report, are rejected at the entering examination or dropped out at the various examinations during the course.

Graduates are commissioned as second lieutenants of the Army, according to their class standing, the highest having choice of the vacancies. The size of the classes varies considerably from year to year and it occasionally happens that a class will be larger than the number of vacancies. Then the graduates are, by law, assigned as additional second lieutenants, to await vacancies.

The matters of gentlemanly and soldierly honor are watched with zealous care by all instructors at the Academy. This is reached, however, rather by indirection, than by severe measures, though the latter are at times applied. There has grown up a sort of unwritten code of honor regulated within the cadet corps. No locks and keys are used in cadet barracks, and a cadet who positively "lies" to an officer will not sleep in barracks many nights after it becomes known to his comrades.

The leading features of our Military Academy have here been outlined in brief because it is the one institution of the country, serving as a model for military education, after which all other institutions having military instruction in any degree must more or less pattern.

MILITARY DEPARTMENTS AT UNIVERSITIES AND COLLEGES.

Besides the United States Military Academy at West Point, which may be considered as strictly a technical military school, the National Government supplies an officer of the army as military professor in 100 of the civil universities

and colleges of the country, apportioned to the several states according to population.

The detail of an officer carries with it a supply of Infantry arms and equipments and ammunition for target practice, artillery field pieces and blank cartridges, and, in some cases, where there are facilities for their use, cavalry arms and equipments.

At the outbreak of the War of the Rebellion there were few schools or colleges throughout the northern states where military instruction was a part of the curriculum, and it was at first difficult to find a sufficient number of drill masters, much less competent company commanders for the northern armies. The officers naturally selected as leaders, on account of their recognized standing among their fellows, had to learn tactics as best they could and then teach them to others. Though, in time, some of these officers astonished the world by their military genius and ability, it was expensive work for the Government, and it was felt throughout the country that the Civil War would have been much shorter in duration, and that thousands of valuable lives would have been saved, if our educated young men, who so patriotically enlisted at the first call for troops, had been previously sufficiently instructed in the military profession to have efficiently filled the positions of subordinate officers.

To obviate such a state of affairs in the future our Congress embodied a remedy in what is known as the "College Land Grant Act" of 1862, which provisions gave to such states as would accept the conditions, public lands to the amount of 30,000 acres for each senator and representative in Congress. The money obtained from the sale of these lands was required to form a permanent fund, the interest of which was to be applied to endowing and supporting educational institutions where the leading object should be to teach such branches of learning as are related to agriculture and the mechanic arts and to include "*military tactics*."

Another bill was passed in 1866, which provided "That for the purpose of promoting knowledge of military science among the young men of the United States, the President may, upon the application of an established college or uni-

versity within the limits of the United States with sufficient capacity to educate at one time not less than 150 male students, detail an officer of the Army to act as president, superintendent, or professor of such college or university; who shall be governed by the general rules to be prescribed from time to time by the President.

In compliance with the above law the President has made rules to be observed by institutions accepting an officer, as follows:

The practical course in Infantry shall embrace small-arms target practice and, as far as possible, all the movements prescribed by the drill regulations of the U. S. Army applicable to a battalion. Instruction in artillery shall embrace as far as practicable, such portions of the United States drill regulations as pertain to the formation of detachments, manual of the piece, mechanical maneuvers, aiming drill, saber exercise, and target practice. Instruction also includes the duty of sentinels, and where practicable, castrametation.

Theoretical instruction shall be given by the professor of military science and tactics, by lecture or recitation, in the drill regulations of the U. S. Army, the preparation of the usual reports and returns pertaining to a company, the organization and administration of the U. S. Army, and the elementary principles governing the art of war.

The military department shall be subject to inspection under the authority of the President of the United States, such inspections to be made when practicable, near the close of the college year.

Upon the graduation of each class the officer detailed as military professor reports to the War Department and to the Adjutant General of the State the names of those students who have shown special aptitude for military service and the names of the three most distinguished in military science and tactics are inserted in the U. S. Army Register.

LECTURE NO. 4.

Military Discipline.

Organization, drill and discipline are carried along simultaneously, and it is difficult to draw dividing lines in defining these terms. Organized bodies of men are but mobs without discipline and discipline is acquired largely through drill, which accustoms men to instinctively obey the orders of those placed over them by authority.

The soldier is to become the educated unit in the higher units of a great human machine, which cannot work until all individual units are educated to the same standard of proficiency, and the power that moves this machine is the will of its commander.

Theoretical instruction alone, cannot convert the "recruit" into the "soldier," he must have the actual practice in connection with other soldiers to understand their combined movements. First of all, he must be "set up" as a soldier, and acquire the habit of yielding his attention to the will of his commander. There is nothing humiliating or degrading in this. On the contrary, the highest type of manhood is found in the "good soldier." Military virtues are courage, honor, loyalty, zeal and obedience, qualities which strengthen the people and the Nation.

The moral instruction of the soldier is in the hands of his comrades as well as his superiors, and a healthy "esprit de corps" is essential to discipline. Pride in the uniform, respect and love for the flag, and loyalty to comrades as well as superiors, should be inculcated. There must be sentiment combined with authority, and "pomp and ceremony" are as essential as battle tactics. The strains of martial music, the sound of the cannon in compliment to the flag, and to high officials and over the graves of dead comrades inspire those patriotic, fraternal

feelings which beget the highest type of discipline, and the authorities which neglect these will have mutiny to deal with sooner or later.

Military discipline should be exercised with firmness, kindness and justice, and when all other measures fail, prompt punishments must be administered.

COURTESIES.

Courtesy is indispensable to discipline, and respect to superiors is not to be confined to obedience on duty, but extended to all occasions.

All officers salute on meeting and in making or receiving official reports. Military courtesy requires the junior to salute first, but when the salute is introductory to a report made at a military ceremony or formation to the representative of a common superior—as for example, to the adjutant, officer of the day, etc.—the officer making the report, whatever his rank, will salute first ; the officer to whom the report is made will acknowledge by saluting, that he has received and understood the report. When under arms the salute is made with the sword or saber if drawn ; otherwise with the hand. A mounted officer dismounts before addressing a superior not mounted.

On official occasions, officers when indoors and under arms do not uncover, but salute with the sword if drawn ; otherwise with the hand. If not under arms, they uncover and stand at attention, but do not salute except when making or receiving reports.

When an enlisted man without arms passes an officer he salutes with the hand farthest from the officer. If mounted, he salutes with the right hand. Officers are saluted whether in uniform or not.

An enlisted man, armed with the saber and out of ranks, salutes all officers with the saber if drawn ; otherwise he salutes with the hand. If on foot and armed with a rifle or carbine, he makes the rifle or carbine salute. A mounted soldier dismounts before addressing an officer not mounted.

A noncommissioned officer or private in command of a detachment without arms salutes all officers with the hand, but if the detachment be on foot and armed

with the rifle or carbine, he makes the rifle or carbine salute, and if armed with a saber he salutes with it.

An enlisted man, if seated, rises on the approach of an officer, faces toward him and salutes. If standing, he faces the officer for the same purpose. If the parties remain in the same place or on the same ground, such compliments need not be repeated. Soldiers actually at work do not cease work to salute an officer unless addressed by him.

An enlisted man makes the prescribed salute with the weapon he is armed with, or if unarmed, whether covered or uncovered, with the hand, before addressing an officer. He also makes the same salute after receiving a reply.

Indoors, an unarmed enlisted man uncovers and stands at attention upon the approach of an officer; he does not salute unless he addresses or is addressed by the officer. If armed, he salutes as heretofore prescribed, without uncovering.

When an officer enters a room where there are soldiers, the word "Attention" is given by some one who perceives him, when all rise and remain standing in the position of a soldier until the officer leaves the room. Soldiers at meals do not rise.

Soldiers at all times and in all situations pay the same compliments to officers of the army, navy and marines, to officers of volunteers and officers of the militia in the service of the United States, as to officers of their own regiments, corps or arm of service.

Officers will at all times acknowledge courtesies by returning salutes given, in the manner prescribed in drill regulations. When several officers in company are saluted, all who are entitled to the salute return it.

HONORS.

The officers named below will be received with standards and colors dropping, officers and troops saluting, and the bands and field music playing, as follows: The President, the President's march; the general, the general's march; the lieutenant-general or the major-general commanding the army, the trumpets

sounding three flourishes or drums beating three ruffles; a major-general, two flourishes or two ruffles; a brigadier-general, one flourish or one ruffle.

To the Vice-President, the members of the cabinet, the chief justice, the president of the senate, the speaker of the house of representatives, American or foreign ambassadors, and governors within their respective states and territories the same honors are paid as to the general; to the assistant secretary of war and to American or foreign envoys or ministers, the same honors as to the lieutenant-general; to officers of the navy the honors due to their assimilated or relative rank; to officers of marines and volunteers and militia when in service of the United States, the honors due to like grades in the regular service; to officers of a foreign service the honors due to their rank.

The national or regimental color or standard, uncased, passing a guard or other armed body will be saluted, the field music sounding "to the color" or "to the standard." Officers or enlisted men passing the uncased color will render the prescribed salute; with no arms in hand, the salute will be made by uncovering.

No honors are paid by troops when on the march or in trenches and no salute is rendered when marching in double time or at the trot or gallop.

"The *commanding officer" is saluted by all commissioned officers in command of troops or detachments. Troops under arms will salute as prescribed in drill regulations.

SALUTES WITH CANNON.

Salutes will be fired between sunrise and sunset only, and, as a rule, not on Sunday. The national flag will always be displayed at the time of firing a salute.

The national salute is 21 guns. The salute to the Union, commemorative of the Declaration of Independence and consisting of one gun for each state, is fired at noon on July 4, at every post provided with artillery.

The President, both on his arrival at and departure from a military post, receives a salute of 21 guns. No other personal salute is fired in his presence.

*The term "commanding officer" applies to commanders of brigades, regiments, battalions, companies, troops, batteries, posts, or detachments acting as independent commands.

The Vice-President and President of the senate receive a salute of 19 guns ; members of the cabinet, the chief justice, the speaker of the house of representatives, American or foreign ambassadors, a committee of Congress officially visiting a military post, and governors within their respective states or territories, receive 17 guns. The assistant secretary of war, when officially visiting a military post, receives 15 guns.

American and foreign envoys or ministers receive 15 guns ; ministers resident accredited to the United States, 13 guns ; charges d'affaires, 11 guns ; consuls-general accredited to the United States, 9 guns.

The sovereign or chief magistrate of a foreign country receives the salute prescribed for the President ; members of a royal family receive the salute due to their sovereign.

The general receives a salute of 17 guns ; the lieutenant-general or major-general commanding the army, 15 guns ; a major-general, 13 guns, and a brigadier-general, 11 guns.

An officer assigned to duty according to his brevet rank is entitled to the salute prescribed for the grade to which he is assigned.

As a rule, a personal salute is fired when the personage entitled to it enters a post.

A general officer is saluted but once a year at each post when notice of his intention to visit it has been given. A retired general officer making an official visit is saluted according to his grade. When several persons, each of whom is entitled to a salute, arrive together at a post, the highest in rank or position is alone saluted. If they arrive successively, each is saluted in turn.

Officers of the Navy are saluted according to their relative rank ; officers of marines and of volunteer forces or militia in the service of the United States and officers of foreign services are saluted according to rank.

The salute to a national flag is 21 guns.

It is the custom of foreign ships of war, on entering a harbor or passing near a fortification to hoist at the fore the flag of the country in whose waters they are, and to salute it. On the completion of the salute to the flag, a salute of the same

number of guns will be promptly returned by the nearest fort or battery. If there be several forts or batteries in sight, or within 6 miles of each other, the one designated "saluting station" will return the salute. United States vessels return salutes to the flag in United States waters only when there is no fort or battery to do so. United States vessels do not salute United States forts or posts.

When a civil functionary, entitled to a salute, arrives at a military post the commanding officer meets or calls upon him as soon as practicable, and will tender him a review, if the garrison consists of not less than four companies. When a general officer visits a post within his command, the troops will be paraded for review, unless he directs otherwise. When a salute is to be given an officer junior to another present at a post, the senior will be notified to that effect by the commanding officer.

The flag of a military post will not be dipped by way of salute or compliment.

VISITS AND COMPLIMENTS.

Officers arriving at the headquarters of a territorial department, military command, or at a military post, will call upon the commander thereof as soon as practicable and register their names. If the visiting officer be senior to the commander, the former may send a card, in which case it becomes the duty of the commander to make the first call.

The interchange of official compliments and visits between foreign military and naval officers and the authorities of a military post is international in character and opens the way to official and social courtesies among the officers. In cases of vessels of war, foreign or otherwise, recently arrived, it is the duty of the post commander to send a suitable officer to offer civilities and assistance. It is expected that this civility will be returned and that within twenty-four hours thereafter, weather permitting, the officer in chief command of the ship or ships will visit the officer in command of the post or station, should the latter be his equal or superior in grade. This visit will be returned within twenty-four hours. Should the naval officer in command be superior in grade to the officer commanding the post or station the first visit will be paid by the latter.

When a military commander officially visits a vessel of war, he will give notice in advance of his intention to do so. He is received at the gang-way by the commander of the vessel and is accompanied there by the same officer when leaving. The officer who is sent with the customary offer of civilities is met at the gang-way of a vessel of war by the officer of the deck, and is presented by the latter to the commander of the vessel.

A vessel of war is approached and boarded by commissioned officers, by the starboard side and gangway. In entering a boat the junior goes first and other officers follow in order of rank ; in leaving a boat the senior goes first. The latter acknowledges the salutes which are given at the gangway of a naval vessel.

Naval vessels fire personal salutes to officers entitled to them when the boats containing them have cleared the ship. It is an acknowledgement of the salute by the officer saluted for his boat to lie on her oars from the first until the last gun and for him to uncover, at the conclusion, to give way. Personal salutes are not returned by military posts.

In case of vessels of war of foreign powers at peace with the United States, lying in our ports or harbors and celebrating their national festivities, the commander of each fort, battery, or military post may participate in the celebration by firing salutes, parading commands, etc. In such a case the flag of the United States will be hoisted and lowered simultaneously with that of the ship on board of which the celebration occurs.

FUNERAL HONORS.

When the funeral of an officer, who was entitled to a salute, takes place at or near a military post, minute guns will be fired while the remains are being borne to the place of interment, but the number of guns will not exceed that to which the officer was entitled as a salute. After the remains are deposited in the grave a salute corresponding to the rank of the deceased will be fired, in addition to three salvos of artillery or three volleys of musketry.

On the death of an officer at a military post the flag is displayed at half-staff and so remains, between reveille and retreat, until the last salvo or volley is

fired over the grave ; or if the remains are not interred at the post, until they are removed therefrom.

During the funeral of an enlisted man at a military post the flag is displayed at half-staff. It is hoisted to the top after the final volley or gun is fired, or after the remains are taken from the post. The same honors are paid on the occasion of the funeral of a retired enlisted man.

When the flag is displayed at half-staff it is lowered to that position from the top of the staff. It is afterwards hoisted to the top before it is finally lowered.

Six pallbearers will be selected from the grade of the deceased or from the next grade above or below.

The badge of military mourning is a knot of black crape worn upon the sword hilt for a period not to exceed thirty days.

The drums of a funeral escort will be covered with black crape or thin black serge.

The colors of a regiment will not be placed in mourning or draped, except when ordered from the War Department. Two streamers of crape seven feet long and about twelve inches wide attached to the ferrule below the spearhead will be used.

DAILY SERVICE.

At all garrisoned military posts there will be daily one parade, morning or evening, as the commanding officer may direct, which will not be dispensed with except on urgent occasions. All officers and men will be present unless specially excused or on duty incompatible with such attendance.

At every military post or station the flag will be hoisted at the sounding of the first note of reveille, or of the first note of the march, if a march be played before the reveille. The flag will be lowered at the sounding of the last note of the retreat, and while the flag is being lowered the band will play The Star Spangled Banner.

In camp and garrison there should be daily at least two roll calls, viz, at reveille and retreat. Commanding officers may also order roll calls in special cases at such times as they deem necessary. The roll will be called on the company parade by the first sergeant, superintended by a commissioned officer.

At retreat roll call the troops are brought to parade rest and so remain during the sounding of retreat.

Except at the ceremony of parade, the result of a roll call will be reported after the companies have been dismissed, to the officer superintending the call, (habitually the adjutant) who will report the result to the commanding officer.

In camp and garrison the commanding officer fixes the hours for reports, issues and roll calls, and for the performance of stated duties and fatigues. In garrison, retreat will be at sunset.

ARREST AND CONFINEMENT.

For the more serious offences against military discipline, officers and non-commissioned officers are placed in arrest, and other soldiers are confined under guard to await trial by a court martial, as provided for in the *Articles of War.

"Commanding officers" only have power to place officers in arrest, except as provided in the 24th Article of War. An arrest may be ordered by the commanding officer, in person or through his staff officer, orally or in writing.

All officers have power to place enlisted men in arrest or confinement. Except as provided in the 24th Article of War or when restraint is necessary, no soldier will be confined without the order of an officer who shall previously inquire into his offense.

Noncommissioned officers will not be confined at the guardhouse in company with privates, except in aggravated cases or where escape is feared, but will be placed in arrest in their barracks or quarters.

An officer arrested will repair at once to his tent or quarters, and there remain until more extended limits have been granted by the commanding officer,

* The Articles of War will be found in U. S. Army Regulations.

on written application. Close confinement will not be enforced except in cases of a serious nature.

Officers will not be placed in arrest for light offenses. For these the censure of the commanding officer will generally answer the purpose of discipline.

An officer in arrest will not wear a sword or visit officially his commanding or other superior officer, unless directed to do so. His applications and requests of every nature will be made in writing.

On the march, field officers and noncommissioned staff officers in arrest will follow in the rear of their respective regiments, and company officers and non-commissioned officers in arrest, in rear of their respective companies, unless otherwise specially directed.

The arrest of a noncommissioned officer or the confinement of a soldier will as soon as practicable, be reported to his company or detachment commander by the officer authorizing the arrest.

RIFLE FIRING.

The following notes are intended for use in connection with the U. S. Infantry drill regulations, to assist in the effective use of the rifle. The Springfield breech-loading rifle, calibre .45 is the one considered to be in use, although the general principles assumed may apply to the use of any rifle, due allowance being made for the difference in mechanism.

THE SPRINGFIELD BREECH-LOADING RIFLE.

This is the firearm that has been in use by our infantry since the War of Secession up to the time of issuing the magazine rifle in 1896. It took its name from Springfield Armory, in Massachusetts, which has been the small-arm manufactory of the United States for many years. Although the magazine rifle has recently been issued to our regular army, the Springfield rifle is still the weapon in the hands of most of the "militia" of the country and the students at our military colleges, and will be in use for many years to come, and many are still reluctant to concede its inferiority to the magazine gun. There are



two sizes known as the "infantry rifle" and the "cadet rifle," the latter being like the former except that it is some three inches shorter, and weighs about one pound less. It was made for the cadets at West Point and is issued to military colleges and schools.

Figure 37 shows the Springfield rifle with bayonet attached.

The rifling consists of three plain concentric grooves, equal in width to the lands, and .005 inches deep, with a uniform twist to the right of one turn in 22 inches. The chamber is made slightly conical so as to facilitate the withdrawal of the cartridge case.

The weight of the "infantry rifle" without bayonet or sling is 9.30 pounds, and the weight of the "cadet rifle," without bayonet or sling is 8.49 pounds. The caliber was originally .58 inches but has been reduced to .45 inches.

The triggers are adjusted to pull off at six to eight pounds.

Figure 38 (page 143) represents a section of the breech mechanism by a vertical plain through the axis of the receiver, with the several parts projected thereon, showing their relative positions.

A, bottom of receiver; B, *barrel*, with its screw thread; C, *breech-screw*, with its circular recess to receive the cam-latch; E, *hinge pin* around which the *breech-block* D turns; F, *cam-latch*, which locks the breech-block in place; G, *cam-latch spring*, to press the cam-latch into the recess; H, *firing-pin*, which transmits the blow of the hammer to the priming of the cartridge; J, *extractor*, to withdraw the empty cartridge shell after firing; K, *ejector spring* and *spindle*.

Fig. 37.

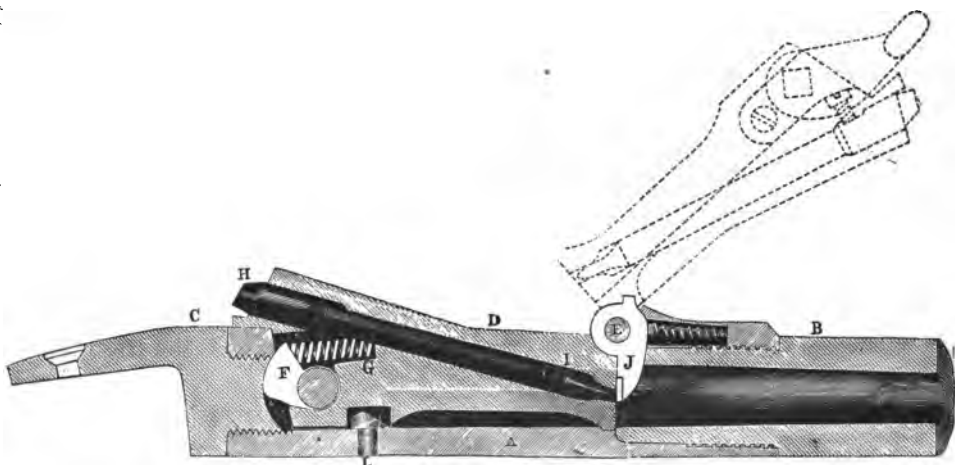


Fig. 38. 1

The *ejector stud* L serves to deflect the shell upward, causing it to clear the *well* of the receiver.

REAR SIGHT.

The present rear sight on the Springfield rifle is adjustable both for elevation and to enable the marksman to correct his aim for wind.

The slide, moving upward to the left, secures automatic adjustment at each elevation for drift.

The leaf *down* is for "point blank" 100 yards; *up* for 200 to 2,000 yards, inclusive, with both open and aperture sights.

The adjustment of other "rear sights" must be learned in accordance with their mechanism, previous to attempting rifle practice.

CARTRIDGE FOR THE SPRINGFIELD RIFLE.

Figure 39 illustrates the solid-head reloading cartridge, caliber .45. It consists of a copper case containing 70 grains of black musket powder, an exterior primer containing one-half grain of percussion composition, and a lubricated lead bullet weighing 500 grains.

Three rectangular cannellures contain the lubricant which consists of bayberry tallow.



Fig. 39.

The cartridge is rendered waterproof by the lubricant and the case being tightly crimped around the bullet.

DIRECTIONS FOR USING THE SPRINGFIELD BREECH-LOADING SYSTEM.

Should the extractor cut through the rim. of the shell and thereby fail to withdraw it, draw the ramrod and drive the shell out.

The chamber should be kept clean, and great care should be observed to prevent cartridges fouled with dirt, and particularly sand, from being inserted or discharged in the piece.

The shell of an exploded cartridge should not be allowed to remain in the chamber any length of time for fear it may adhere by corrosion.

Headless-shells are removed with a small instrument which the soldier carries in his pocket known as the "headless-shell extractor."

TO CLEAN THE BARREL.

A wet flannel rag should be first passed through the bore; this should be only sufficiently moistened to soften and remove the greater portion of the residuum of the powder; if any excess of water is employed, the difficulty of wiping the piece dry is enhanced and the possibility of rusting the extractor or the head of the breech-screw is much increased. Hot water should not be used, as cold or tepid water will dissolve the residuum much better. Several oiled flannel or strong cotton rags should next be used; these should fit the bore closely and be run up and down several times to remove any lead. After the bore is clean it should be wiped out with a dry rag to remove any excess of oil. Cos-

moline oil is the best for this purpose. Sperm and sewing-machine oils are also good. Olive oil often gums and should not be used. A wooden cleaning rod should always be employed, as the iron ramrod may scratch the bore and injure the rifling.

When practice is concluded the piece should be at once cleaned before the fouling has had time to harden.

TO CLEAN THE LOCK.

Wipe every part with a moist rag and then a dry one; if any part of the interior shows rust put a drop of oil on the point or end of a piece of soft wood dipped into *flour* of emery; rub out the rust, clean and wipe the surface dry, then rub every part with a slightly oiled rag.

TO CLEAN THE MOUNTINGS.

Remove dirt from the screw-holes by screwing a piece of soft wood into them.

Wipe clean with a linen rag and leave the parts slightly oiled. In cleaning the arms great care should be observed to preserve the qualities essential to service rather than to obtain a bright polish.

Burnishing the barrel (or other parts) should be strictly avoided, as it tends to crook the barrel and also to destroy the uniformity of the exterior finish of the arm.

Browned arms are cleaned by rubbing them hard with an oiled rag until the oil is well incorporated with the browning.

When the ramrod is used for any purpose, care should be taken not to injure the rifling; it should never be "sprung" in the bore, as in the old muzzle-loading smooth-bore arms.

In ordering arms, let the butt be brought gently to the ground, especially when the exercises take place on pavements or hard roads. This will save the mechanism of the lock from shocks which are very injurious to it, and which tend to loosen and mar the screws and split the woodwork.

No cutting, marking, or scraping in any way the wood or iron should be allowed, and no part of the gun should be touched with a file. Take every possible care to prevent water from getting in between the lock or barrel and stock. If any should get there, dismount the gun as soon as possible, clean and oil the parts and see that they are perfectly dry before reassembling them.

DRIFT.

It has been found that in firing a rifle with right hand twist rifling, as in the service rifle, the projectile has a tendency to deviate to the right of the plane of fire. This is reversed in firing with an arm rifled with left-hand twist rifling. This deviation is called the drift.

The "drift" for the Springfield rifle, cal .45 is to the right; three inches at 200 yards, five inches at 300 yards, $11\frac{1}{2}$ inches at 500 yards and 43 inches at 1000 yards.

VELOCITY.

The muzzle velocity of the rifle bullet fired from the Springfield rifle, cal. .45, is 1,315.7 feet per second.

MAXIMUM RANGE.

With the service ammunition, i. e., 70 grains, and a 500 grain bullet, the maximum range of the Springfield rifle, cal. 45, is 3,500 yards, the angle of elevation being $29^{\circ} 45' 36''$, the penetration 10 inches in sand; time of flight, 21.2 seconds.

DEFINITIONS.

The line of fire is the axis of the bore prolonged.

The plane of fire is a vertical plane through the line of fire.

The line of sight is the right line from the eye to the object to be hit, passing through the front and rear sights.

The *natural line of sight* is the right line through the lowest notch of the rear sight and the front-sight.

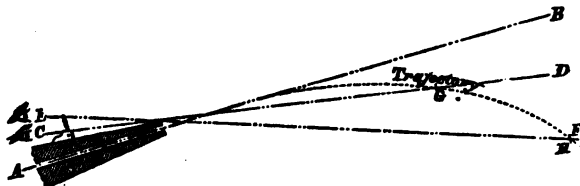


Fig. 40.

In figure 40, the line A B, illustrates “the line of fire”; C D, the natural line of sight; E F, the artificial “line of sight,” G, the “point-blank,” and H the artificial point-blank.

To aim the piece correctly, the eye, the notch in the rear sight, the front sight, and the object, must be in the same right line, lying in the plane of fire. The rear sight must be vertical or there will be a deviation in the direction towards which the sight is tipped.

An object is at *point-blank* distance when it can be hit by aiming directly at it along the natural line of sight.

This distance, with the present arm, is one hundred yards.

To hit an object within the *point-blank*, the piece is aimed below it.

To hit an object beyond the *point-blank*, the muzzle has to be raised, which is effected by elevating the notch on the rear sight along a vertical leaf, on which are graduated distances; by this means artificial *point-blanks* are established, the piece being aimed as when at *point-blank*.

TRAJECTORY.

The curve which the bullet describes, after leaving the rifle, is called the “trajectory.”

A bullet discharged from the rifle is acted upon by several forces—the three principle forces being the projectile force, acting to propel it in a straight line (the line of fire); the force of gravity, which tends it toward the centre of the earth; the resistance of the air, acting to retard the bullet.

The combined effect of these three forces causes the bullet to assume a curve in its flight, called the "trajectory," as illustrated in Figure 41.

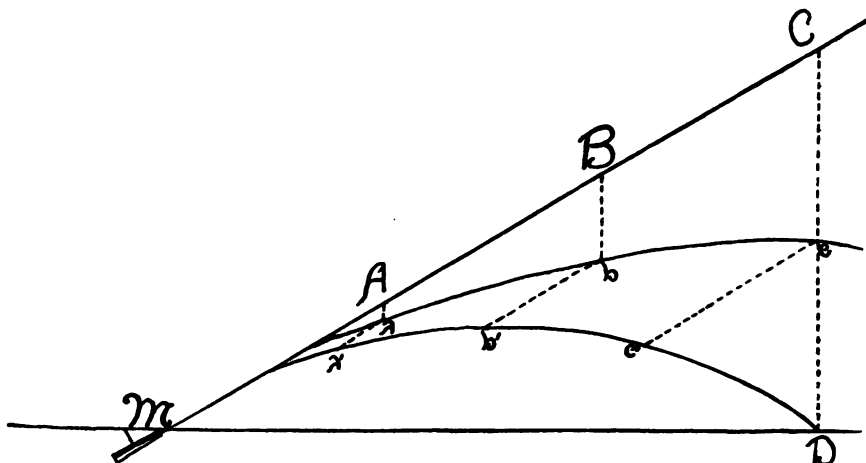


Fig. 41.

M C being the line of fire, and M D the line of sight, suppose that the bullet leaves the muzzle of the rifle at M with such a velocity that, considering only the projectile force, it will be at A at the end of one second, at B at the end of two seconds and at C at the end of three seconds.

The action of the force of gravity upon bodies in motion is the same as when at rest, and consequently under the combined action of the projectile force and the force of gravity the bullet would be at the points a, b, c, at the end of one, two and three seconds, respectively. But, retarded by the atmosphere in connection with the other two forces, the bullet would be at a', b', c'.

Connecting the points a', b', c' and D, the trajectory is constructed.

In connection with the three principle forces given above, the effect of the wind, and "drift" must be considered, also the condition of the atmosphere as regards temperature and humidity, the kind of ammunition, the varying light, etc.

DANGEROUS SPACE.

As the trajectory at long ranges rises to a considerable height, e. g., 43 feet, when firing with the Springfield rifle at 1000 yards—there is only a certain dis-

tance near the muzzle of the rifle and near the object aimed at, in which a man standing would be hit by a bullet in its flight. This is called "dangerous space."

It is about all dangerous space at the 200 yard range when firing the Springfield rifle, but at the 1000 yard range, the dangerous space for infantry, in the rising branch of the trajectory, is only five yards, and in the falling branch only thirteen yards in front of the target.

AIMING POSITIONS.

The standing, kneeling and lying positions are illustrated in the U. S. Drill Regulations. The standing position is taken for distances up to include 200 yards; the kneeling position, for distances between 200 and 500 yards, and the lying position for 500 yards and all greater distances.

SIGHTING.

In rifle shooting, most men find it easier to sight with the right eye alone than with both eyes open. The latter, however, is a far better mode of shooting at movable objects and at short ranges, and the art is not difficult to acquire after some few trials.

The chief requisite is to bend the neck, holding the head well over, and pressing the cheek firmly against the stock, so that the muzzle sight shall be exactly opposite the center of the forehead.

In using military sights, the safest way is to draw a "full sight." The difficulty of being certain that the same amount of the fore-sight is drawn every time is much greater when a "fine" or "half-sight" is drawn; and there is also more blur with the two latter. For this reason, the best shots bring up the front sight until they can just see the edge of the block at the bottom of the notch of the rear sight, thus exposing the entire front sight. In target firing, some aim directly at the bull's-eye. It is a better plan to aim either at the lower corner or one side, so as to give a full view of the bull's-eye. If the aim is taken directly on the bull's-eye, the front sight covers it so as render the aim uncertain.



Fig. 42.



Fig. 43.



Fig. 44.

Figure 42 illustrates the full-sight. Figure 43 illustrates the fine-sight. Figure 44 illustrates the half-sight.

The effect of the full-sight is to cause a higher point to be struck than if either of the other kinds of sights are taken. The fine-sight will cause a lower point to be struck.

PULLING THE TRIGGER.

The trigger is pulled by a steadily increasing pressure of the finger in the direction of the axis of the piece, the breath always being held from the commencement of the pressure till the hammer strikes.

If the trigger be pulled by a convulsive motion, the muzzle will be moved to the right.

After learning to pull the trigger without deranging the aim, the men are taught to support the recoil by pressing the butt firmly against the shoulder with the right hand ; the left hand supports the weight of the piece, and steadies it in aiming.

The men are next given blank cartridges to accustom them to the noise of the piece, and further confirm them in the principles of aiming and firing.

VOLLEY FIRING.

After men have been instructed as individuals, experience shows that if the commands are properly given men will shoot as well and sometimes better by volley, than when firing singly.

All authorities concede that, in future, infantry fire will be employed by volley, and at the extreme ranges.

If the officer, in giving the commands, after the word aim, will count in a distinct voice, one, two, three, with a second's interval before the command fire,

the men will be greatly aided in taking sight, by knowing just how much time they have.

GALLERY PRACTICE.

Men, by squads or sections, may, with profit, be instructed in the principles of aiming and sighting, indoors, previous to range-firing. To this end, a target is made, having a black circle about two inches in diameter for the center, and exterior to it, two concentric black rings.

The target may be tacked to the side of the room and a table or tripod on which rests a sand-bag placed at a short distance from the target. The upper surface of the sand-bag should be at the height of the shoulder.

The instructor indents the sand bag slightly, and places the rifle on it, aiming it accurately at the bull's-eye." He then requires the men separately to examine the aim, causing them to close the left eye. He next deranges the piece and causes the men successively to direct it on the bull's-eye, verifying each aim and deranging it before the next man steps forward. The instructor next aims the piece above, below, to the right or left of the bull's-eye, and requires the men to state the error and to correct it. These lessons are repeated at different distances, the instructor exposing faults and requiring the men to correct them.

RANGE FIRING.

After men have been taught the aiming positions and the use of the sights they should be taken upon an out-door range, fitted up with targets for the various ranges and "butts" behind which markers can safely stand to indicate the "hits," so that they can be scored at the firing points. Individual practice should at first be conducted at known distances, only two men being placed at the firing point at the same time, to fire alternately under the direction of a competent coach. Practice should commence at 100 yards, and as soon as men are able to score 60% they should be moved back to 200 yards, and after they are able to score 60% at 200 yards they should be moved back to the 300, 500, 600, 800 and 1000 yard ranges in succession.

KNOWN DISTANCE TARGETS.

Figure 45 illustrates the "short range" target used for 100, 200 and 300 yards.

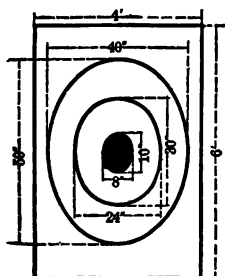


Fig. 45.

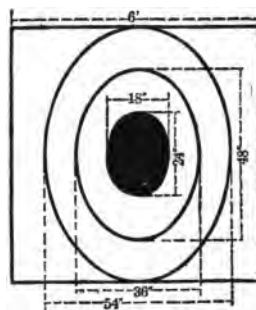


Fig. 46.

The shape of the bull's-eye and concentric rings is elliptical with transverse axis, vertical. The dimensions are given on the target.

Figure 46 shows the dimensions for the "mid-range" target used for 400, 500 and 600 yards.

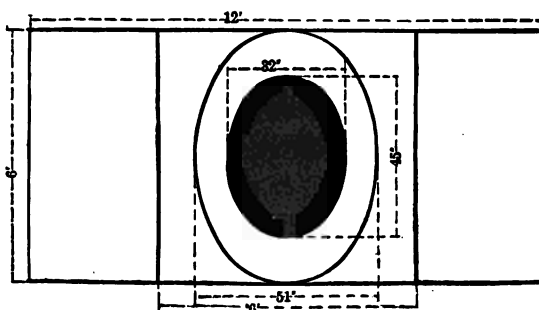


Fig. 47.

Figure 47 shows the dimensions of the "long-range" target used for all distances above 600 yards up to 1400 yards.

MARKING AND SCORING.

A "bull's-eye" counts five, and is marked at the target by a white disc. A hit within the first ellipse next the bull's-eye counts four and is marked by a red

disc. A hit within the outer ellipse (or square on the long range target) counts three, and is marked by a black and white disc. A hit on the target outside of the outer ellipse or square counts two and is marked with a black disc. A miss counts zero, and is marked by waving a red flag several times across the front of the target.

SKIRMISH FIRING.

When the soldier has become fairly proficient in individual firing at known distances he should be practiced in firing as a skirmisher at figure targets at varying distances.

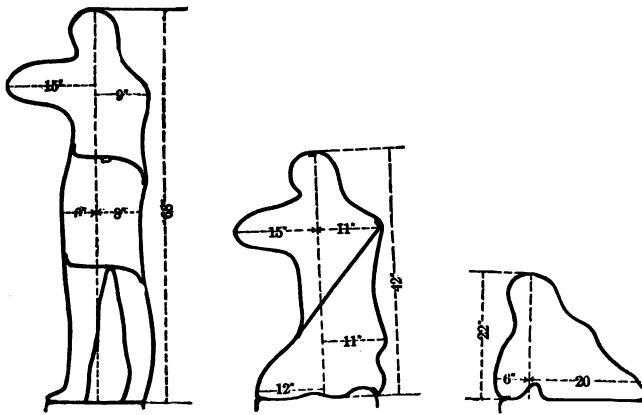


Fig. 48.

Figure 48 shows the three skirmish targets in use, viz : the standing target, the kneeling target and the lying target. These skirmish targets are iron skeleton frames, representing the outline of a soldier in the firing positions standing, kneeling and lying, and are retained in a vertical position by points at the bottom of the frame and by a sustaining rod, slanting to the rear, back of the target. When used as targets they are covered with cloth and over this with black paper.

A hit on the standing target counts three, on the kneeling target four and on the lying target five.

The practice should be by squads, the square being deployed as skirmishers with intervals of five yards, at about 600 yards from the targets.

The skirmish targets should be arranged in groups, each group consisting of one standing, one kneeling and one lying target with the kneeling figure in the middle, the distance between groups being five yards, measuring from the center of one group to the center of the next group, the targets in the same group being near together but not touching.

Numbers should be placed over each group, and each skirmisher assigned a group by its number, the number of groups thereby corresponding to the number of skirmishers.

The instructor should be accompanied by a trumpeter and carry a stop watch. The commands should be sounded by the trumpeter.

At the command "*Forward, MARCH,*" the line will advance, first at quick and then, at the proper commands, at the double time until the signal "*Skirmishers, HALT,*" which will be immediately followed by the signal "*Commence, FIRING,*" when the sights will be adjusted to the estimated distance, the rifle loaded, and the position for firing assumed. After the last note of the signal "*Commence, FIRING,*" the firing will be opened. The firing will cease at the *last note* of the signal "*Cease, FIRING,*" which note will be sounded exactly thirty seconds after the last note of the signal "*Commence, FIRING.*"

As soon as the firing is completed the line will advance without delay in the same manner as before the first halt, at quick and then at double time, until the succeeding halt is ordered.

Having approached in this manner a point a little more than 200 yards from the targets, the signal, "*To the rear, MARCH,*" will be given, when the manœuvring to the rear and the firing will be conducted as upon the advance. The rifles will be pointed in the general direction of the targets when manœuvring to the rear.

Five halts will be made in advancing and five in retiring; they will be at approximately regular intervals, dividing uniformly the ground manœuvred over.

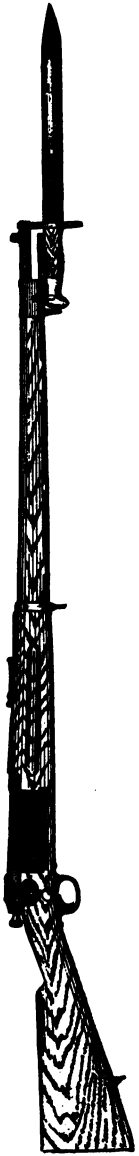


Fig. 49.

At least one shot will be fired at each halt, and twenty or forty shots may be fired at the ten halts by each skirmisher, as decided by the instructor previous to the start.

The hits will be counted after the squad has completed the "run" (from the 600 yard point down to the 200 yard point and return.)

Five points will be deducted from each skirmisher's score for each failure to fire one shot at each halt and for each shot fired in excess of the number designated by the instructor, and for each shot fired before the last note of the signal *Commence FIRING* or after the last note of the signal *Cease FIRING*.

RECORD AND CLASSIFICATION.

Record should be kept of every shot fired at a target ; individual records at known distances being by scores of 10 shots each. Individual skirmish firing should also be recorded and such a classification adopted as will best stimulate proficiency, the object of instruction being to develop in a body of troops such a state of discipline, such a knowledge of the capabilities of their weapon and such accuracy in its use as will render their fire effective in battle.

THE UNITED STATES MAGAZINE RIFLE.

The United States Government has recently adopted and issued to the regular army a magazine rifle, calibre .30. Figure 49 gives a side view of the rifle with the knife bayonet attached. The knife bayonet, when detached, can be used to dig up earth for hasty intrenchments and as a hunting knife. Figure 50 illustrates the cartridge.

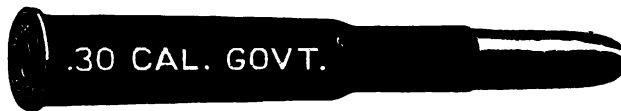


Fig. 50.

The bullet is a nickeled steel case, filled with lead, weighing 220 grains. About 30 grains of smokeless powder are used, giving a velocity of 2,000 feet per second, and a trajectory so flat that at 600 yards it does not rise above the height of a man.

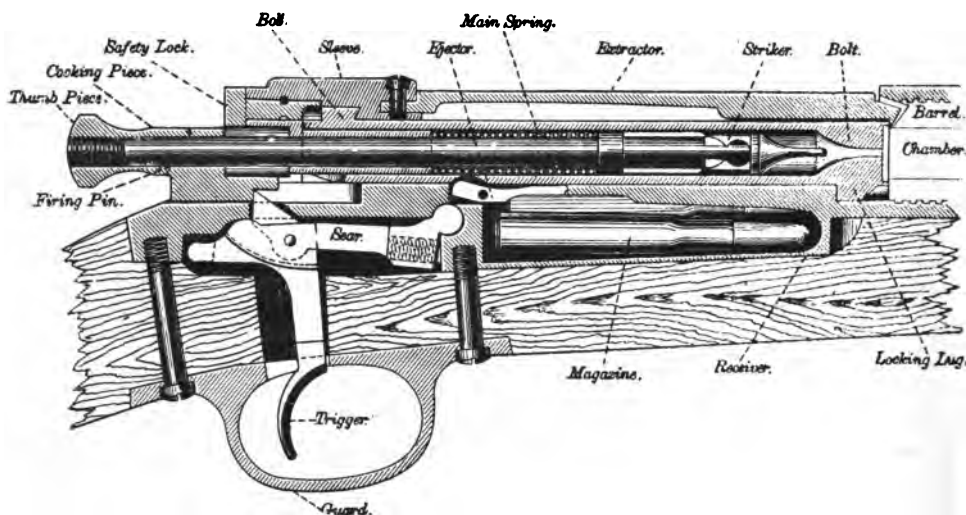


Fig. 51.

Figure 51 shows the breech mechanism. This is a "bolt" gun and belongs to that class of magazine arms in which the magazine is located centrally, at the rear of the barrel. It is horizontal under the "receiver." Figure 52 represents a cross section of the receiver and magazine, the latter, fully charged, but cut off.

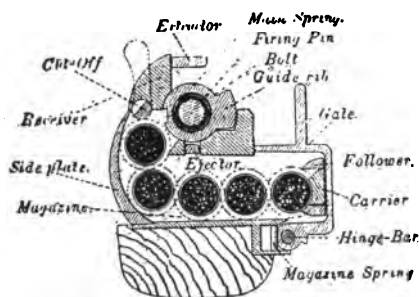


Fig. 52.

The weapon can be used, *first*, as a magazine arm, the cartridges for each fire being fed only from the magazine, which is recharged when entirely or when

partly emptied; *second*, as a single loader, with magazine ignored and not charged; *third*, as a single loader, with magazine charged but held in reserve by the cut off. The magazine, having been emptied, can be filled, or, if one or more cartridges have been fired from it, can be replenished by first opening the gate.

The rifling is by four grooves, with a uniform twist to the right of one turn in 10 inches. The depth of the grooves is .004 inches. The trigger pull is $4\frac{1}{2}$ to 6 pounds. The total weight of the arm without bayonet is 9.355 pounds.

CLEANING AND CARE OF THE ARM.

As the residuum of smokeless powder, if not completely removed, corrodes the bore in a short time, care is required in cleaning the arm after the firing.

To clean the barrel, remove the bolt and wipe out the chamber and receiver with a dry rag, removing any unburned powder; then clean the bore and chamber with a rag saturated with soda water, and wipe thoroughly dry with a clean rag; finally, oil bore and chamber with cosmoline oil, leaving a light coating.

The cleaning and care of the arm is otherwise the same as for the Springfield rifle.

THE CARBINE.

The cavalry arm, called a "carbine" only differs from the infantry rifle in the length of the barrel and stock, in having no bayonet and in having a swivel-bar and ring on the left side of the stock opposite the lock for attaching the carbine sling, which the soldier wears over his left shoulder when mounted.

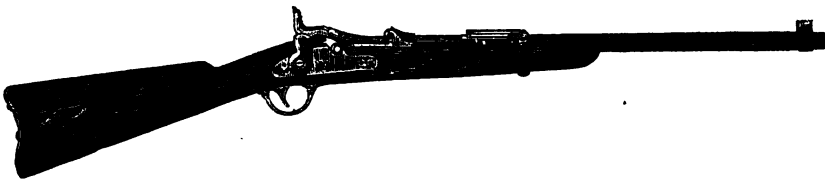


Fig. 53.

Figure 53 shows the Springfield carbine. The length of the barrel and also the length of the arm complete is ten inches less than that of the infantry rifle.

Our cavalry are now armed with the magazine carbine of the same model as the infantry magazine rifle.

THE PISTOL.

The cavalry and artillery are armed with pistols which are also issued to non-commissioned officers of infantry for field service.



Fig. 54.

Figure 54 shows the side elevation of the Colt's army pistol, calibre 38. It is rifled with a left hand twist and has six chambers.

Officers wear the pistol for field service.

Troops armed with the pistol should be instructed in its use, and the practice for mounted troops should be conducted mounted. The pistol is carried in a holster attached to the belt on the right side, so as to leave the stock of the pistol to the front.

The best results in firing with the pistol are obtained by following the method of snap shooting. For this practice, take the position of "Raise, PISTOL" by grasping the stock in the holster with the right hand, the back of the hand to the body, draw it from the holster, reverse it, muzzle up, the hand holding the stock with the thumb and last three fingers; forefinger outside of the guard, guard to the front, barrel vertical, hand as high as the neck and six inches to the right and front of the right shoulder. Cock the piece with the right thumb, carry the forefinger lightly against the trigger and direct the eyes towards the objective. Thrust the point of the pistol towards the

objective, arm nearly or quite extended, keeping the eyes on the object and pulling the trigger when the pistol comes to a stop.

An almost imperceptible pause may be allowed between the thrusting and firing, in which to correctly point the pistol. After firing a shot resume the position of "raise," cock the piece and continue the firing until the six chambers are exhausted.

For double action pistols, the firing is executed the same, except that the pistol is recocked by pressing steadily on the trigger. These motions should be repeated several times without cartridges, after which blank cartridges should be used for a few rounds, before loading with ball cartridges.

For scoring, dismounted, the same target may be used as for firing with the rifle at 200 yards. The practice should first be at 10 yards and afterwards at 25 yards, 50 yards and 75 yards.

For mounted practice six standing skirmish targets may be used, arranged in line 20 yards apart, the firer riding along the line of targets and delivering fire at each target in succession, first moving at a walk and afterwards at a trot and at a gallop, on a track five yards from the line of targets.

For front fire, each firer uses but one target, moving towards the target from a point about 100 yards distant and discharging six shots in succession as he approaches the target, care being taken to turn the horse sufficiently to the right or left at each discharge to avoid firing too near the horse's ear.

FIRE DISCIPLINE.

Napoleon said, "Fire is everything, the rest is of small account."

While we must not interpret this maxim to the depreciation of any part of the art of war, the most important phase of military instruction is embodied in the term "fire discipline," as it involves the one purpose for which the government has soldiers; all other steps in military preparations being but auxiliary to this.

It cannot be expected that students in college will be able to devote sufficient time to target practice to become expert marksmen, but they should have access

to a range and be practiced firing there, during their theoretical course, at each of the ranges from 100 back at least to 500 yards so as to see the practical effect of fire-arms and appreciate that their weapons are something besides school-boy toys. The various operations pertaining to known distance, skirmish and volley firing upon the range give the practical side to the education, without which the theoretical, makes but little impression, and any institution that attempts military instruction should provide a target ground for its military department as much as work shops and laboratories for its agriculture, industrial arts, engineering and chemistry.

With these facilities, and not without, fire discipline can be comprehended and worked out in such a way as to furnish object lessons to be carried in memory for use when men may be hastily summoned to defend the flag in future years. The drill regulations give the general rules for "fire discipline" and for manœuvering for defense and attack, and by the use of blank cartridges character can be given to battle exercises.

The subject will be treated more in detail in Lecture No. 10 under the heading "Tactics."

Index to Part I.

LECTURE NO. 1.

	Page.		Page.
Army Organization	5	Tactical Units.....	13
Organization Table U.S. Army (Peace		Infantry.....	13
footing).....	6	Cavalry.....	13
Functions of the Staff Departments..	7	Artillery.....	13
Grades of Rank—Officers.....	8	Engineer Troops.....	14
Grades of Rank—Cadets and Non-		Signal Troops.....	14
Commissioned Officers.....	9	Hospital Corps.....	15
Uniforms.....	10	The Division.....	15
Command Appropriate to Grades of		The Army Corps.....	15
Officers.....	10	A Separate Army in the Field.....	16
Staffs of General Officers.....	11	Army of the United States	16
Staffs of Other Officers.....	12		

LECTURE NO. 2.

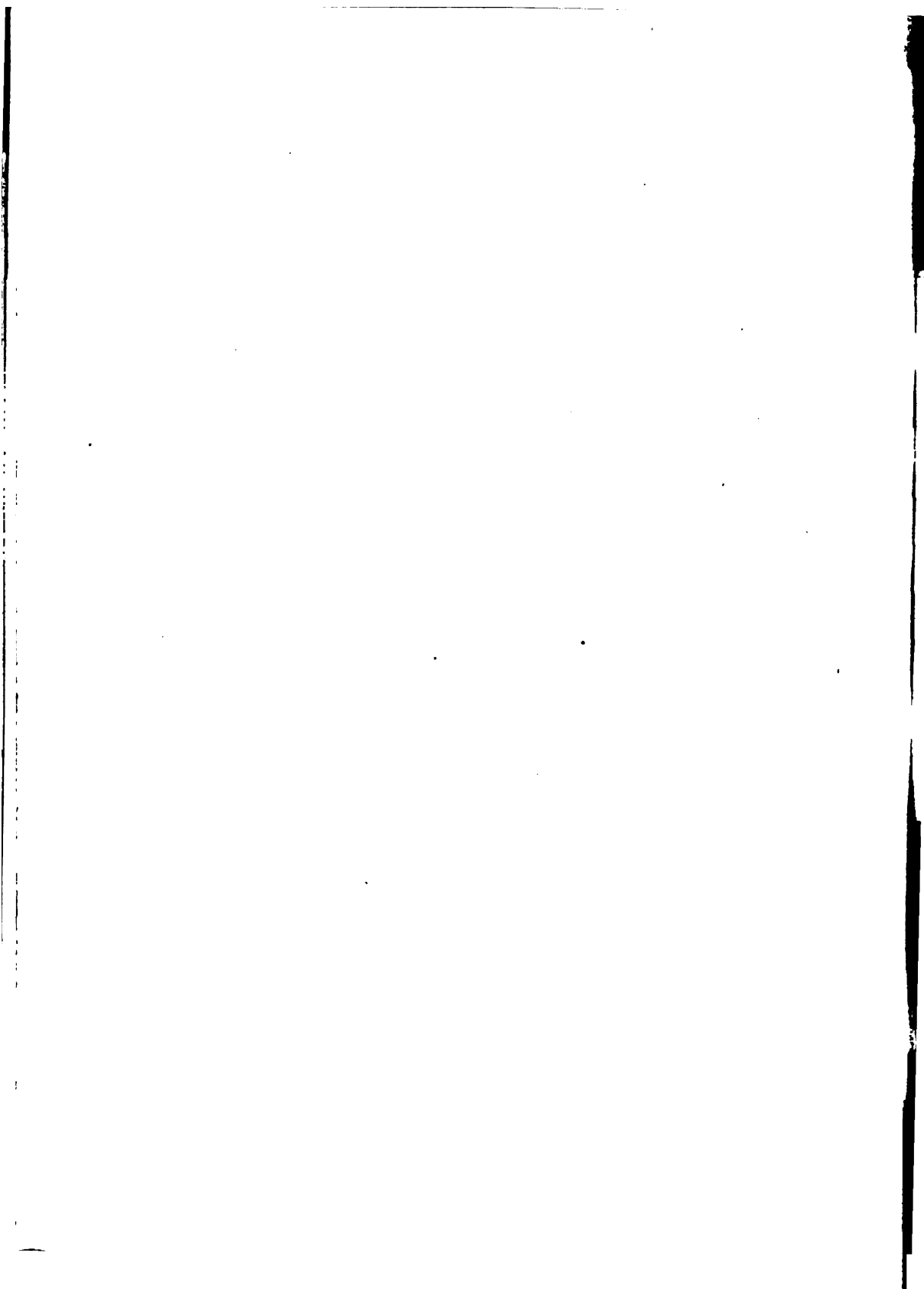
The Line of the Army.....	17	Quartermaster's Employees	45
Uniforms.....	18	Veterinary Surgeons.....	45
General Officers.....	19	Clerks and Messengers.....	46
Proportions of the Three Arms.....	20	Indian Scouts.....	46
Infantry.....	20	Routine Duty Within a Regiment....	46
Rifle Pits.....	23	The Company, Troop and Battery....	46
Machine Guns.....	24	Sick Report Book.....	49
Infantry Action.....	24	The Battalion or Squadron.....	52
Cavalry.....	25	Regiment.....	53
Artillery.....	28	Field Officers.....	54
Cannon.....	28	Regimental Staff.....	54
Light Artillery.....	29	Duties of Regimental Officers.....	54
Siege Artillery.....	31	Duties of Regimental Quartermaster..	55
Sea Coast Artillery.....	32	Commissary	55
Mortars and Howitzers.....	33	Surgeon and Assistant Surgeons....	55
Special Troops.....	34	Chaplain.....	56
Engineer Troops.....	34	Non-Commissioned Staff.....	56
Signal Troops.....	36	Band.....	56
U. S. Signal and Telegraph Code		Field Music.....	57
(Morse).....	37	Drum Major.....	57
The Heliograph.....	38	Flags.....	59
Hospital Corps.....	40	Colors and Standards.....	59
Wagon Trains.....	42	Guidons.....	60
Horse Depot.....	45	Camp Colors.....	60

LECTURE NO. 3.

	Page		Page
The Staff Departments.....	61	Public Animals.....	88
Military Secretary.....	61	Clothing.....	88
Aides-de-Camp to General Officers....	61	Subsistence Department.....	88
Adjutant General's Department.....	62	Rations.....	89
Correspondence.....	63	Cooking Utensils.....	91
Boards.....	66	Medical Department.....	91
Orders.....	67	Military Hygiene.....	93
Returns of Troops.....	69	Pay Department.....	95
Muster.....	69	Corps of Engineers.....	95
Appointment and Promotion of		Seacoast and Harbor Defenses.....	96
Commissioned Officers.....	69	Submarine Mines and Torpedoes....	101
Recruitment of the U. S. Army....	70	Submarine Mines.....	102
Theory of Our Military Establish-		Torpedoes.....	104
ment.....	71	Electricity Applied to Warfare.....	106
History of the Army of the United		Ordnance Department.....	108
States.....	72	Small Arms.....	108
War of 1812 to 1815 with Great		Projectile Arms.....	108
Britain.....	72	Cannon.....	110
War with Mexico, 1846 to 1848..	73	Projectiles.....	110
War of Secession.....	74	Shot.....	111
Inspector General's Department.....	75	Shells.....	111
Judge Advocate General's Depart-		Revolving or Rapid Fire Guns.....	112
ment.....	75	Explosives.....	113
The Laws of War and Military Com-		Gunpowder.....	113
missions.....	75	High Explosives.....	114
Military Law.....	76	Gun Cotton.....	115
Courts Martial.....	76	Nitro Glycerine.....	115
General Court Martial.....	77	Dynamite.....	115
Field Officers' Court.....	78	Blasting Gelatine.....	116
Summary Court.....	78	Fulminate of Mercury.....	116
Garrison Court Martial.....	78	Smokeless Powder.....	116
Regimental Court Martial.....	78	Signal Corps.....	118
Moot Court Martial.....	79	Myer's Signal Code.....	119
Courts of Inquiry.....	79	Numerals.....	120
Quartermaster's Department.....	80	To Send a Message.....	120
Transportation.....	80	Pigeons as Message Carriers.....	122
Wagon Trains.....	81	Military Ballooning.....	123
Pack Trains.....	81	Post Chaplains.....	125
Railroad Transportation.....	83	Retired Officers and Enlisted Men... 125	
Water Transportation.....	86	The United States Military Academy 126	
Tents and Tent Equipage.....	87	Military Departments at Universities	
Fuel and Stationery.....	88	and Colleges.....	129
Barracks and Quarters.....	88		

LECTURE NO. 4.

	Page		Page
Military Discipline.....	132	Maximum Range.....	146
Courtesies.....	133	Definitions.....	146
Honors.....	134	Trajectory.....	147
Salutes with Cannon.....	135	Dangerous Space.....	148
Visits and Compliments.....	137	Aiming Position.....	149
Funeral Honors.....	138	Sighting.....	149
Daily Service.....	139	Pulling the Trigger.....	150
Arrest and Confinement.....	140	Volley Firing.....	150
Rifle Firing.....	141	Gallery Practice.....	151
The Springfield Breech-Loading Rifle.....	141	Range Firing.....	151
Rear Sight.....	143	Known Distance Targets.....	152
Cartridge for the Springfield Rifle.....	143	Marking and Scoring.....	152
Directions for using the Springfield B. L. System.....	144	Skirmish Firing.....	153
To Clean the Barrel.....	144	Record and Classification.....	155
To Clean the Lock.....	145	The U. S. Magazine Rifle.....	155
To Clean the Mounting.....	145	Cleaning and Care of the Arm.....	157
Drift.....	146	The Carbine.....	157
Velocity.....	146	The Pistol.....	158
		Fire Discipline.....	159





**This book should be returned to
the Library on or before the last date
stamped below.**

**A fine of five cents a day is incurred
by retaining it beyond the specified
time.**

Please return promptly.